Evolutionary aspects of gift-giving dynamics among Norwegian students

Cand. scient. thesis in behavioral ecology

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1 Abstract

Data from questionnaires filled out by 336 students during a nine day period in January and February 1999 at the University of Oslo, Norway was analyzed to find patterns in gift-giving behavior corresponding to predicted evolutionary biological and evolutionary psychological hypotheses. Gifts given and received, people given to and received from, monetary value of gifts given and estimated monetary value of gifts received were tallied. We tested the effects of four main factors: kin and non-kin, civil status, sex and birth order. Birth order had several groupings, but the most common was firstborn/middleborn/lastborn (linear birth-order). Middleborns and lastborns grouped together were called laterborns. From Hamilton's rule we predicted that students would give more the higher the coefficient of relatedness, which was found. About twice as much was spent per member of near family (parents and siblings) than half-near family (grandparents, uncles/aunts, nieces/nephews; and first cousins were included). First cousins seemed to be an exception to the rule, receiving as much as near family. Children got twice as much as the other near-family members, and partner stood out receiving the most of all receivers, about four times as much as near-family members. Friends received the same amount as half-near family. All students gave to their near family, 218 to grandparents, 64 to aunts and 77 to uncles, 63 to nephews/nieces, 93 to cousins and 222 gave to friends. There were effects of civil status; cohabiting students gave more to their partners and less to their friends and own family than married and dating students. Dating students were most active in gift giving overall. There were sex differences; overall, we found women to be more active in gift giving than men. And finally, there were birth-order differences; overall, firstborns were more active than laterborns in gift giving, especially with half-near family. Middleborns invested slightly more on friends than firstborns. Lastborns, though giving to least friends, spent the largest total amount of money on them compared to firstborns and middleborns. Lastborns were the least active in gift giving in general. Lastborns and middleborns invested somewhat more in friends than firstborns. The results are supportive of earlier findings from other studies.

Keywords: gift giving, gifts, student population, Norway, inclusive fitness, kin-selection, reciprocal altruism, reciprocity, sex differences, birth order, civil status, gift making, Hamilton's rule, parent-sibling conflict, family niches, EEA, evolved mental mechanisms, adapted mental modules.

2 Introduction

Evolutionary biology is a science dedicated to the understanding of origins. The title of Darwin's (1859) "On the origin of species" is a witness to this. If we truly are to understand why and how something exists, then we must understand the process of its origination. Many biologists, when confronted with a conundrum of the living world, end up asking: How came this to be? That is not just an expression of amazement, but an important investigative stance. Questions about origin in biology are in essence an inquiry into how complexity arises from simple beginnings. When biologists study a species, they usually record recurring features in the individuals and label these as a part of that species' characteristics. As a biologist one would certainly label gift giving as a characteristic, a behavior, of the human species. It is a general and widespread characteristic and, although being expressed in many different forms, identifiable as a system of behavior (Carrier, 1995; Cheal, 1988; Essock-Vitale and McGuire, 1980; Mauss, 1950/1990). Being humans, we all give and receive gifts (Brown, 1991), and we all know the peculiarities and often contradictory emotions of this behavior. We know that value, effort, symbolism, timing, setting, means, ends, recipient, giver create axes in a multiplex of expression and impression. And we have engaged in various detailed musing like: '*Why* did he give me that, why did *he* give me that, why did he *give* me that, and why did he give me *that?'* We surprise ourselves by how strongly and quickly we react emotionally if a gift that we receive or give turn out to be *improper,* either too expensive, too cheap, too symbolic, too weird, too boring, too useless or too difficult to reciprocate. Clearly, a lot is at stake here. We also wonder at how a gift might be defined, and how fuzzy the distinction. When is something a gift and when is it not? We do favors, but some are enjoyable in their own right; we give time and compassion, sometimes returned, sometimes not; and we risk health, money and reputation for the benefit of others. We see that gift giving comprises a norm integral to the society that we live in, and is expressed differently in different cultures, often with amazing importance and vigilance (Mauss, 1950/1990).

This thesis is about such behavior in humans, and is attempting to explain some of the basic properties of that behavior following from its simple beginnings by using traditional biological theory and a newer field, *evolutionary psychology* (Buss, 1999). Gift giving is a very complex human behavior (Mauss, 1950/1990; Essock-Vitale and McGuire, 1980) so the attempt will be non-exhaustive, general and designated to describe the common denominators of human gift giving.

We look at how kinship and friendship affect gift giving, and we use three group properties of humans - sex, birth order, and civil status - to identify patterns in gift-giving behavior than can reveal some of its evolutionary foundations.

Extending traditional biological theory, evolutionary psychology has invoked new and exciting tools to further the systematic understanding of how and why our species evolved to be what it is today and why we behave the way we do. In order to fully appreciate the kind of reasoning that evolutionary psychology can offer the understanding of gift-giving dynamics and behavior, we must shed light on two central aspects applied in this thesis.

First, we look at the aspects of the *Environment of Evolutionary Adaptedness*, or EEA for short. Evolutionary psychologists Leda Cosmides and John Tooby define the EEA as the "statistical composite of selection pressures that occurred during an adaptation's period of evolution responsible for producing the adaptation" (Buss, 1999, p. 38). Any adaptation requires stable environmental conditions with prolonged selection pressures to form, so that the animals can solve the problems of surviving, feeding and reproducing. During roughly 2.5 million years, the savannah and bush land of Africa was in essence the EEA for human beings. In evolutionary terms we only recently shifted our EEA into an agricultural and residential way of life in large societies; and some indigenous peoples still have never done so. One should not be tempted to think that the EEA is a static environment, nor that it is limited to selection pressures driven by natural factors alone (like predation, disease and food acquisition). For most species, the EEA is also the composite of selection pressures from competition within and between the species and the sexes. As humans came to dominate the African plains by evolving cultures of tool, weapon and fire making along with higher intelligence and hunting prowess, the *significant* composites of the EEA shifted toward factors of human-to-human interaction. And it is of course the human-related composites of the EEA we explore on the grounds of evolution shaping our gift-giving behavior.

Second, we look at the evolutionary psychological concepts of *evolved mental mechanisms* also called *adapted mental modules*. One of the foundations of evolutionary psychology is that the human mind consists of mental mechanisms that evolved to solve the adaptive problems that our ancestors faced during their evolutionary past; everything from feeding to recognizing faces. Any behavior we engage in and any ability we today possess is considered to be an expression of the differential activation of these modules. Like all humans share the same number of arms, legs, organs and overall body plan, all humans share these modules; the differences between persons and between cultures lie simply in how these modules are activated (Barkow, Cosmides & Tooby, 1992). Therefore, understanding the situations that our species regularly experienced during its evolutionary past is paramount to understanding and identifying these possible mental mechanisms.

From the work of William Hamilton (Hamilton, 1964) and Robert Trivers (Trivers, 1971), we use the traditional evolutionary concepts of *inclusive fitness* and *reciprocal altruism* to act as explanatory principles of resource investments between kin and between non-kin respectively.

Hamilton worked out a rule describing the conditions under which selfless behavior toward kin can evolve, called Hamilton's rule, $c < rb$. It states that an altruistic behavior towards an individual could evolve only if the benefits (b), multiplied by the relatedness of the individual (r), outweigh the costs (c). The rule predicts an animal to invest twice as much in an individual which it shares half of it's genes with ($r = 0.5$) compared to one with which it shares a quarter ($r = 0.25$). In humans, $r = 0.5$ are parents, children and siblings, and $r = 0.25$ are grandparents, uncles and aunts, and nephews and nieces. This is often called the theory of *inclusive fitness*, since an animal can increase its own genetic fitness by increasing their relatives'.

Following the theoretical implications of Hamilton's reasoning, Robert Trivers developed the principles of *parent-offspring conflict* (Trivers, 1974). One of the implications of this principle is that since parents are not necessarily selected to agree with their offspring on how their time and resources should be divided, siblings are selected to compete for the attention of the parents to gain the better part of this investment. Behavior shaped by sibling rivalry can evolve if the sibling's personal genetic fitness gain by that behavior is more than twice the inclusive fitness loss of the other sibling. Since parents share half the genes with any of their children, relatedness will not be the factor deciding investment, but the future reproductive potential of their children. Faced with limited resources, parents have been shaped by evolution to be sensitive to cues revealing differences in their children's potential inclusive fitness. Parental discrimination leads to family niches within the sibship, prompts the development of unique personalities and generates behaviors emphasizing indispensability in the siblings.

This takes us to one of the three factors used to examine gift giving in this thesis, namely *birth order*. Where a child is positioned in the birth order is fundamental to the niches available to it (Sulloway, 1996). Since firstborns have a head start on laterborns, firstborns tend to follow in their parents footsteps and chose a niche which optimizes the benefits of their parents' life experience. With this niche occupied, laterborns must find some other niche that equally guarantees parental attention. Middleborns represent a special case, since they start off as lastborns, but end up wedged between firstborns and lastborns when lastborn arrives. Firstborns are favored by parents because of their greater reproductive value and lastborns because they usually represent the terminal vehicle of their reproductive output. Middleborns are trapped somewhere in between and lose out on average in the parental investment game. Historian of science and evolutionary psychologist Frank Sulloway has suggested that in addition to generating sibling niches, the struggle for parental attention also differentiate children in the formative years of their personality and that the siblings' position in the birth order is the best explanation for this effect (Sulloway, 1996). Using a traditional test of personality (OCEAN) Sulloway has shown statistically that firstborns are "more conforming, traditional, responsible, organized, planful, dominant, assertive, jealous and closely identified with parents" and laterborns are "more easygoing, cooperative, open to new experiences and popular". Middleborns were found "to be more flexible, to favor compromise, be tactical, show willingness to share, have less closeness to parents, and more closeness to siblings and friends".

Trivers (1971) also developed the concept of *reciprocal altruism*, from the implications of Hamilton's work, which state that a seemingly altruistic behavior might evolve if the cost of the behavior is outweighed by the benefits of one or more future reciprocal acts. It is thought that reciprocal altruism has evolved in social groups as an extension of inclusive fitness, but various simulations have shown that it can develop on its own in a setting with repeated encounters with agents that remember acts of defection and cooperation (Axelrod, 1984). In non-kin alliances, for example friends, this form of altruism is the only one, since there is no genetic factor and costs have to at least equal benefits. A romantic partner is a special case of non-kin relation, and this leads us to *civil status*, one of the three factors we examined to see whether different levels of romantic commitment affect how the students

give presents. Being in a relationship should affect the distribution of resources. Willingness to invest in a partner is a courtship ritual that signals a willingness to invest in possible offspring with that partner. Investment in the parent of one's child is tantamount to investment in that child and possibly future children, and therefore an extension of inclusive fitness. Men and women have evolved to agree on achieving common evolutionary ends, by making sure that the shared genetic vehicles for their fitness, their children, fare well. This finally lead us to *sex differences,* which we also wanted to see whether affected gift giving in our student sample. Women are known to have complex social networks compared to men and these alliances require maintenance through acts of reciprocity (Essock-Vitale & McGuire, 1985). They invest more time and resources in their offspring, and they are in need of resources and support in times of pregnancy and breast feeding (Judge, & Hrdy, 1995).

Do these described differences in men, women, firstborns, middleborns, lastborns, single or romantically committed, predicted by evolutionary theory, give witness to underlying mental mechanisms that produce similar differences in gift dynamics?

Well, let's see what we can find.

3 Materials and methods

3.1 The questionnaire

The participation criteria were:

1) That the students had to come from families celebrating Christmas as a gift-giving tradition.

2) That they had celebrated Christmas of 1998.

The students were told that they would be participating in a questionnaire for a master degree in biology on gift behavior; and that it was anonymous.

The questionnaire had 39 pages consisting of 9 sections listed below as they appeared:

1. Personal information
2. Gift dynamics
   a) Parents
   b) Siblings
      c) Children of siblings (nephews and nieces)
   d) Grandparents
   e) Children
   f) Partner
      g) Partner's family
   h) Aunts and uncles
      i) Children of uncles and aunts (first cousins)
   j) Friends
   k) Others

Personal information
We asked the students general personal information about their age, sex, civil status, income and student loan and stipend.
Then we asked them detailed questions about their sibship: How many siblings they had, the favorite sibling, whether they had a twin, the birth order position they had in the sibship, and the sexual birth order of all siblings, for example MFM for a sibship of three with a firstborn male, a secondborn female and a thirdborn male. They were asked if anything happened in their life that made their biological birth order different from their functional birth order, for example step-siblings moving in, siblings dying, a parent moving out and taking one or more children with them and how old they were when it happened. We asked whether the student was the oldest sibling; the distance in years and months to the nearest younger sibling; and if not, the distance to the nearest older sibling; and finally, how much the students enjoyed giving Christmas gifts.

Gift dynamics
In the following sections, we asked questions about the gifts given, the gifts received, money spent per gift, assumed value of gifts received from various categories of family members, and friends; and also the category "others", people that didn't fit in any of the other categories, like "great-grandparents", "second cousins", "friend of the family", "ex step-father", and so on.

The students were always asked if they gave a gift to each of the categories, however, some of the other questions differed from category to category (see table 3.1).

*Table 3.1. Questions differing from category to category**

	Gift receiving	Price of gifts received	Helpers on gift given**	Gift self-made	Gift also to partner	Helpers ** on gift received	Spend Christmas with	Meetings	Age of recipient	Emotional relation
Parents	■	■	■	■	■	■	■	■		■
Siblings	■	■	■	■		■	■		■	
Nieces/ Nephews			■				■		■	
Grand parents	■	■	■	■	■	■	■	■	■	■
Children			■	■					■	
Partner	■	■		■						
Partner's family										
Aunts/ Uncles	■	■	■	■		■	■	■	■	■
First cousins			■				■		■	
Friends	■		■	■				■	■	
Others							■			

*The shaded areas show the questions that were asked.
**Helpers are people participating on the gifts given or received.

In addition to the questions in the table, we asked for the receivers' sex where it wasn't obvious from the name of the category (like siblings); we asked if siblings were step-sibling, half-sibling, adopted sibling or genetic sibling and whether the students lived with their siblings or parents and the duration of the students relationship with their partner.

3.2 Study location

The University of Oslo is spread about the city, with the main body of faculties located at the Blindern campus. This campus, Blindern, was chosen for the survey, because of the amount and density of students. The neighboring Faculty of Medicine was also included.

3.3 The study population

This is an overview of the sex, age, birth order, parents, children, civil status and income of the students in our sample, and general demographics of the students at the university at the time of the sampling.

Students in Norway and at the University of Oslo in 1999
On a national scale, there were a total of 163,958 students in higher education in Norway (http://dbh.nsd.uib.no/dbhvev/). This was approximately 3.7% of the country's 4,445,329 inhabitants (http://statbank.ssb.no/statistikkbanken/).

The number of students studying at Blindern campus in Oslo and the nearby Faculty of Medicine was estimated to be a total of 23,097 in 1999 (table AT1).

There were 58% female and 42% male students at the University of Oslo in 1999 (http://dbh.nsd.uib.no/dbhvev/).

Our study population
The sample of students (n = 336) were from the following faculties at the University of Oslo: Humanities (n = 125), Mathematics and Natural Sciences (n = 108), Social Sciences (n = 49), Education (n = 27), Medicine (n = 10), Law (n = 8); and there were 9 students in introductory courses that had not yet planned where they wanted to study.

As the Faculty of Law is not located in the target area of study, its representation in the survey was not planned, but since there were no reason to omit the data from those students (8), they are included in the study.

These 6 faculties, of the 8 faculties of the University of Oslo, represent the majority of students (table AT1). The two remaining faculties, Dentistry and Theology, were not included, partially because of distance and partially because of their relatively low student number. Although the Faculty of Medicine did not yield an impressive return, and it is located away from Blindern campus, it was chosen with the number of potential students in mind (AT1). The Faculty of Law was decided to be to too far away for sampling to be practical.

The faculty distribution of the students included (n = 336) was the arbitrary result of our efforts to optimize the number of questionnaires collected in the shortest possible amount of time. Large reading halls, libraries and computer terminal rooms within walking distance from each other were targeted, namely 2 libraries, 1 computer room and 4 reading halls. The locations that could house the most students, and thus the ones that yielded the highest return of questionnaires, were a large library in the Faculty of Humanities and a large reading hall in the Faculty of Mathematics and Natural Science.

Sex, birth order and age
In our sample of 336 students, 168 were women and 168 were men. For both sexes the age lay between 19 and 44 years with a mean of 22.9 years (SD = 3.6). For the women the age range was 19-44, mean 22.7 years (SD = 4.1). For the men the age range was 19-38, mean 23.1 years (SD = 3.0).

Age of students correlated positively with both age of mother ($p < 0.0005$, $R^2 = 0.28$) and age of father ($p < 0.0005$, $R^2 = 0.18$).

In our sample of 336 students, 160 were firstborns (80 women, 80 men) and 176 were laterborns (88 women, 88 men).

Firstborns and middleborns had younger mothers and fathers than lastborns (both $p < 0.0005$).

Dividing laterborns further into middleborn and lastborn, with middleborn as a group including all children that are neither the firstborn nor lastborn child, yields 60 middleborns (31 women, 29 men) and 116 lastborns (57 women, 59 men) (table 3.2).

Table 3.2. Age of students in relation to sex and birth order

Birth Order	Women			Men			Total		
	Mean	SD	n	Mean	SD	n	Mean	SD	n
Firstborn	22.4	4.1	80	23.3	3.1	80	22.8	3.7	**160**
Middleborn	22.8	4.0	31	23.3	3.0	29	23.0	3.5	**60**
Lastborn	23.2	4.2	57	22.7	2.8	59	22.9	3.5	**116**
Total	**22.7**	**4.1**	**168**	**23.1**	**3.0**	**168**	**22.9**	**3.6**	**336**

Parents
Four students reported mother to be deceased and 9 reported father to be deceased, with one of them having lost both parents.

We explicitly asked if the students spent Christmas Eve (the time Christmas gifts are opened in Norway) with mother and/or father. 294 students reported that they celebrated Christmas with mother present, 35 students reported that they did not, the remaining seven did not answer. 266 students reported that they celebrated Christmas with father present, 57 students reported that they did not, the remaining 13 did not answer. 20 students reported that they celebrated Christmas with neither mother nor father, 10 only with father, 36 only with mother, and 251 reported that they celebrated with both, 19 did not answer.

76 students reported that they lived with mother, 254 answered no and 5 did not answer. 64 students reported that they lived with father, 259 answered no and 13 did not answer. 59 students reported that they lived with both of the parents, 4 only with father and 16 only with mother and 240 that they lived with neither of them, 17 did not answer.

We also asked the students to rate the quality of relation to their mother and father during their upbringing on a scale from 1 to 9 where 1 represented 'Very conflict-filled' and 9 'Very harmonic'.

Children
18 students had children (mean age of students 30.3 (SD = 7.2)). Of these 13 were women (age 30.9 (SD = 7.9)) and 5 were men (age 28.8 (SD = 5.8)). 6 mothers were firstborn, 3 were middleborn and 4 were lastborn. 2 fathers were firstborn, none were middleborn and 3 were lastborn.

Civil status
79 students were in a relationship (mean duration 2.0 years (SD = 1.8)), 70 were cohabiting (mean duration 3.7 years (SD = 2.8)), 19 were married (mean duration 5.6 years (SD = 5.2)); 1 was separated and 166 were single.

Income
The students' (n = 336) yearly income varied from zero to NOK 450,000, with a mean of NOK 87,567 (SD = 43,628). For women (n = 168) income per year lay between zero and 230,000 NOK, with a mean of 86,128 NOK (SD = 36,322). For men (n = 168) income per year lay between zero and 450,000 NOK and zero, with a mean of 88,997 NOK (SD = 49,913). After removing outlier NOK 450,000 and NOK 320,000 from men, we found no effects of sex on income ($F = 0.03$, $df = 331$, $p = 0.83$).

Firstborns, middleborns and lastborns had a max income of NOK 320,000, NOK 450,000, NOK 200,000, respectively, with a mean of NOK 85,975 (SD = 41714), NOK 95,926 (SD = 59,247), NOK 85,327 (SD = 35,599), respectively. After removing outlier NOK 450,000 from firstborns and NOK 320,000 from middleborns, we found no birth-order effects on income ($F = 0.49$, $df = 330$, $p = 0.61$).

The yearly income for the average Norwegian was NOK 261,900 in 1998 (http://www.ssb.no). In December 1998 one USD was worth NOK 7.60 and one GBP was worth NOK 12.76 (http://www.bcci.bg/services/currency/index.php3).

3.4 Collecting data

We collected data during nine weekdays from Thursday 21st of January 1999 to Friday 5th of February.

The days collecting data were kept quite uniform regarding length and numbers of visits per day. They would start at nine in the morning and end at six in the afternoon with a morning hand-out around 09.00, a second around 11.00 and a third around 15.00. The filled-out questionnaires were then collected the following morning.

Due to an accumulated overweight of female student returns, an effort was made to balance the sex-ratio by not handing out questionnaires to women on the last field day (table AT3).

Measures were taken to not hand out the questionnaire at the same hour of day per location on consecutive days to minimize any possible confounding effect between study hours and possible gift behavior; and in general increase independent sampling. The field days were discontinued as soon as we found the number of returned questionnaires to represent an adequate sized statistical population.

3.5 The response

All students asked were shown the questionnaire and given a brief description of it. Due to the voluminous character of the questionnaire (39 typed pages), the students were informed that it could take as much as 30 minutes to fill out, but they were also told that they could do it at any time during the day, and when finished, hand it over to a librarian or attendant. The students were additionally asked if they could assess whether it was realistic that they would actually fill out the questionnaire on that day or whether another day would be more appropriate, so as to minimize the number of resulting negative returns. It was our impression that most students wanted to participate and had a positive attitude to it, but some declined and when they did, they usually gave a reason why, if not, we would ask for one.

Here is a compilation of the most common reasons for decline, sorted by frequency:

1. Not a good day, they had a lot to do in general, another day would be better.
2. Not enough time to fill out the questionnaire before lecture, meeting, leaving the university that day etc.
3. Not a good period, they didn't have time at all because of exams, assignments etc.
4. They didn't want to because of the size of questionnaire.
5. They didn't want to fill out anything.
6. Did not celebrate Christmas with family.

In general, women were more positive than men and gave more information on why they resigned to accept the questionnaire. Women also seemed more active in evaluating the amount of work that would be required to fill out the questionnaire before they accepted. Their responses were also less vague when compared to men; they would either say that it would be impossible for them to do it or that they most definitely would do it. Men often responded that they would take a look at it or that they were more or less sure that they would look into it during the day etc.

The importance of the students filling out the questionnaire once they accepted it was stressed - and it was pointed out that if they weren't sure whether they would do get the time to actually do it, that it would be better to hand it out to them another day, or to someone else.

In total 652 students (282 women and 370 men) were asked to participate in the questionnaire. Of these 41 women and 62 men declined, while 241 women and 308 men accepted. The discrepancy between the number of women and men asked reflects the more

forthcoming attitude to the questionnaire among the women students. We had to ask more men to get a balanced sex-ratio in our sample.

All in all 549 questionnaires (241 women and 308 men) were handed out and 168 women and 168 men returned valid questionnaires. Of the 340 students who filled out and returned the questionnaire during the 9 field days, 4 students were removed from the data set because they didn't celebrate Christmas with their families.
So, although all students were informed of the two participation criteria during the hand-out, there regrettably were some misunderstandings. Also 12 questionnaires were returned blank or incompletely filled-out.
For an overview of these numbers see tables AT2.-AT4.

3.6 Coding of data and statistical analyses

In this section, we first explain the way we categorized and coded the data, and then the methods we used in analyzing them.

3.6.1 Categorization and coding of data

We analyzed the effects of three different categorical predictor variables on three main response variables of gift-giving dynamics. The predictor variables were Civil Status, Sex and Birth order, and the response variables were Gift-relations, Gifts and Money. The response variables were subdivided into donating and receiving: Gift-giving relations, Gift-receiving relations, Gifts given, Gifts received, Money spent, Money received. Money was often combined with another variable, for example Money spent per gift.

Gift-giving relations are the number of people a student gave at least one gift to and gift-receiving relations are the number of people a student received at least one gift from.
In the questionnaire, there were more questions about gift giving than gift receiving, therefore the students often reported more gift-giving relations than gift-receiving relations (for example we did not ask whether first cousins gave gifts, see table 3.1).
To adjust for this in various tests, we removed the gift-giving relations with those persons that the students were unable to report a gift-receiving relation with. In the text, this adjustment is often referred to as "when the gift-giving and the gift-receiving relations are with the same people".

When coding for gifts given or received, the number of gifts were divided by the number of participants in on the gift, and if it was given to someone else in addition. This means for example that you can give a third of a gift to your sister if your mother and father were in on it, and if that gift also was given to the partner of your sister, it would be a sixth of a gift. This makes the numbers of gifts a bit unpredictable and can sometimes seem counter-intuitive, for example when the number of gifts given is lower than the number of recipients given to. The same is done with cost of gifts. However, gift-giving/receiving relations are always integers. By this definition, giving half a gift to someone, you have a gift-giving relation with that person.

Firstborns are always one sibling, the oldest. Lastborns are also always one sibling, the youngest; any sibling inbetween were coded as middleborns. In some tests, the grouping laterborns is used. Laterborns are defined as all siblings that aren't firstborns, or only-children. We had four twins and they were classified as three middleborns and one lastborn.

All siblings whether step, half or adopted were classified as genetic family. Students being more than six years older than their younger sibling were coded as both firstborn and "age-gap"-firstborn depending on the test used (firstborns being much older than their younger siblings, can be expected to display personality characteristics more like only-children). Only-children were coded as firstborns and only-children depending on the test used. We always used biological birth order, because no student reported a change in their birth order before the age of seven.

Birth order was coded as Linear birth order (LBO) with firstborns as 1, middleborns as 2 and lastborn as 3; and also as Quadratic birth order (QBO) with firstborns and lastborns as -1 and middleborns as 2.

We used four other arrangements in our study:

Firstborn-Laterborn (F/L)
Firstborns (F) tested against middleborns and lastborns grouped together as laterborns (L).

Age-gap simple - AGEGAP1 (F/AL/L)
Firstborns and only-children coded as F, age-gap laterborn as AL, laterborns without age-gap as L.

Age-gap extended - AGEGAP2 (O/AF/F/AM/M/L/AL)
Only-children were coded as O, firstborns more than six years older than their nearest younger sibling as AF, firstborns as F, middleborns more than six years younger than their nearest older sibling as AM (age-gap middleborns), middleborns as M, lastborns as L, and lastborns more than six years younger than their nearest older sibling as AL

Sex pattern (O/FO/FS/M/LO/LS)
Only children were coded as O, firstborns with opposite sex as nearest youngest sibling as FO, firstborns with same sex as nearest youngest sibling as FS, middleborns as M, lastborns with same sex as nearest oldest sibling as LS, and lastborns with nearest oldest sibling with opposite sex as LO.

All of these except the sex-pattern coding, which is a novel attempt, were used after advice by Frank Sulloway (personal correspondence, 2007).

In some of our coding we use the categories near family and half-near family. Near family are all the relatives with a coefficient of genetic relatedness of 0.5, that is parents, children and siblings (also included are non-genetic siblings in our study). Half-near family are the relatives that have a coefficient of genetic relatedness of less than 0.5: grandparents (0.25), uncles/aunts (0.25), nephews/nieces (0.25) and first cousins (0.125).

Partners of aunts and uncles were not categorized as genetic family, but along with the category “others”. Step-parents were classified as genetic family, but they were not included among genetic parents when genetic parents were studied separately.

Civil status was defined by four categories: single students (Single), students with partners (Partner), students living with their partner (Cohabiting) and married students (Married). We excluded partners (husband/wife, boyfriend/girlfriend) and their families from the measurements when comparing students of different civil status groups as to remove bias against single students (i.e. single can’t give to or receive from partners or partners family and so get less gift-giving/receiving relation because of this).

We asked students to rate their emotional relation to either a person or the act of buying or making Christmas gifts. The scale of these emotional measurements, were from 1 to 9, with 1 being lowest and 9 being highest.

3.6.2 Statistical analyses

The analyses were performed using the statistical analysis package S-Plus 6.2.
We used t-tests and ANOVA for group variance testing between students of different sex, civil status and birth order. We transformed the data using square-root and log-transformations to achieve normality. Homogenity of the data was tested for by looking at residual plots and normality of the data was tested for by looking at QQ-plots. Outliers were tested for both graphically and by using Cook’s distance tests. Outliers removed are individually reported if they are few, otherwise they are simply mentioned in numbers. When achieving normality failed, we used Wilcoxon rank sum test and Wilcoxon signed rank test as a replacement for standard t-test and paired t-test, respectively. Similarly, we used Kruskal-Wallis test on groups more than two. For proportions and counts tests, we used Pearson Chi-square test. For pairwise comparisons tests in ANOVA, we used Scheffé when using imbalanced data sets and Tukey when balanced. We used type III sum of Squares results and adjusted means for two-factor ANOVAs when the data was imbalanced.

4 Results

This section is subdivided into four chapters. First, there is an overview of general results; second, results from gift giving with kin, partners and friends; third, results from civil status; fourth, results from sex differences; and finally results from birth-order dynamics.

4.1 General

This section covers an overview of the students' gift giving and gift receiving, their income, age, emotional relation with closest family, enjoyment in buying or making Christmas gifts, the correlation between gift giving to friends and family, the correlation between gift spending and gift receiving; and self-made gifts and self-procured gifts.

4.1.1 Gift-giving and gift-receiving relations

All of the students gave and received Christmas gifts. They gave to 4013 persons (mean 11.9, SD = 6.0), their "gift-giving relations", and received from 2951 persons (mean 8.8, SD = 3.7), their "gift-receiving relations" (table 4.1). When the gift-giving and the gift-receiving relations are with the same people, gift-giving relations are adjusted to 2711 persons (mean 8.1, SD = 3.5). After this adjustment, the students were shown to receive Christmas gifts from significantly more persons than they gave to ($p < 0.0001$). There was a strong positive correlation between gift-giving relations and gift-receiving relations ($R^2 = 0.79$, $p < 0.0001$), and the number of potential people and the number of people given to, correlated positively ($R^2 = 0.16$, $p < 0.0001$).

4.1.2 Gifts given and gifts received

The students gave 4355 gifts (mean 13.0, SD = 7.4) and received 3889 gifts (mean 11.6, SD = 5.5). When gifts given and gifts received are of the same categories of persons, gifts given are adjusted to 3135 gifts (mean 9.3, SD = 5.2). The students received more gifts than they gave ($p < 0.0001$), and the number of gifts given was positively correlated with gifts received ($R^2 = 0.52$, $p < 0.0001$).

4.1.3 Cost of gifts given and received

The average student spent in total NOK 1,689 (SD = 1,218) on gifts, NOK 159 (SD = 117) per receiver and NOK 154 (SD = 116) per gift; and received gifts worth NOK 3,821 (SD = 3042) in total, NOK 619 (SD = 589) per giver and NOK 381 (SD = 364) per gift. As noted above, not all the categories of givers were amongst the receivers, and this may have caused the large sums of money received compared to spent, for example were friends not included. When money spent on Christmas gifts were of the same category as money received, money spent per receiver was adjusted up to NOK 229 (SD = 170) and money spent per gift to NOK 220 (SD = 198) - see table 4.3. After the adjustment, money received

was still significantly more than money spent in both per receiver and per gift ($p < 0.0001$).

There were significant correlations between spending and receiving in total ($R^2 = 0.06$, $p < 0.0001$), per person ($R^2 = 0.68$, $p < 0.0001$) and per gift ($R^2 = 0.62$, $p < 0.0001$).

4.1.4 Income

Money spent on Christmas gifts were shown to correlate positively with income ($F = 7.03$, $df = 322$, $p = 0.0084$, $R^2 = 0.02$, square-root transformed data). We removed 12 outliers from income and one (NOK 551,667) from money spent.

4.1.5 Age

Removing outlier NOK 551,667, money spent on Christmas gifts in total did not correlate with age of students ($F = 0.57$, $df = 331$, $p = 0.25$, $R^2 = 0.004$, log-transformed data).

Removing outlier NOK 25,600, money received on Christmas gifts in total correlated positively with age of students ($F = 4.15$, $df = 331$, $p = 0.04$, $R^2 = 0.01$, log-transformed data).

4.1.6 Emotional relation with mother and father

On a scale from 1 to 9, the relation with mother was on average 7.14 (SD = 1.54) and with father 6.77 (SD = 1.90), with the difference being significant ($t = 3.54$, $df = 332$, $p = 0.0005$), showing students having a closer emotional relation with their mother. The two relations correlated positively with each other ($F = 57.04$, $df = 331$, $p < 0.0001$, $R^2 = 0.15$).

4.1.7 Sibling closest to heart

The students that had two siblings were asked which the favorite one was. Of these students (72), firstborns preferred middleborns most of the time (16 out of 26, 62%), middleborns preferred lastborns most of the time (18 out 29, 62%) and lastborns preferred middleborns most of the time (12 out of 17, 71%). In total, firstborns were favored by 23%, middleborns by 44% and lastborns by 33% of the students, but the differences were not significant ($\chi^2 = 3.63$, $df = 2$, $p = 0.16$).

To see whether students simply had a preference for the nearest sibling in the birth order lineup, we isolated the students with a sibship size of four or more (so that wherever you were in the birth order, you could step at least two steps in a direction). There were 36 students that had a sibship size of four or more, 21 of them reported the nearest sibling as favorite and 15 reported a sibling two or more steps away as favorite. A proportions count for the preferences showed no significant difference ($\chi^2 = 0.69$, $df = 1$, $p = 0.41$). Grouping the students into two groups, one that preferred the nearest sibling and the other a sibling

two or more steps away, showed sibship size (max 8, mean 3.5, SD = 0.9) having no effect on preference ($Z = 1.17$, $p = 0.24$). Correlating sibship size with number of steps away the favorite sibling was, showed no effect ($F = 2.69$, $df = 33$, $p = 0.11$, $R^2 = 0.08$). When students with a sibship size of exactly four were tested, 15 out of 23 preferred the closest sibling, but not significantly so ($\chi^2 = 1.57$, $df = 1$, $p = 0.21$).

32 students reported the favorite sibling to be a woman; and 40 to be a man. This difference was not significant ($\chi^2 = 0.68$, $df = 1$, $p = 0.41$).

4.1.8 Enjoyment in buying or making Christmas gifts

There was a correlation between the enjoyment in buying or making Christmas gifts and the total amount of money spent ($F = 54.81$, $df = 328$, $p < 0.0001$, $R^2 = 0.14$, square root-transformed data; after removing six outliers), the total amount of money spent on genetic family ($F = 22.65$, $df = 330$, $p < 0.0001$, $R^2 = 0.06$, square root-transformed data; after removing four outliers) and the total amount of money spent on friends ($F = 22.63$, $df = 333$, $p < 0.0001$, $R^2 = 0.06$, square root-transformed data; after removing one outlier).

There was a correlation between enjoyment in buying or making Christmas gifts and the total number of gifts given ($F = 88.42$, $df = 333$, $p < 0.0001$, $R^2 = 0.21$, square root-transformed data; after removing one outlier), the total number of gifts given to genetic family ($F = 44.57$, $df = 333$, $p < 0.0001$, $R^2 = 0.11$, square root-transformed data; after removing one outlier) and the total number of gifts given to friends ($F = 40.14$, $df = 333$, $p < 0.0001$, $R^2 = 0.11$, square root-transformed data; after removing one outlier).

Age did not correlate with the enjoyment in buying or making Christmas gifts ($F = 1.14$, $df = 331$, $p = 0.29$, $R^2 = 0.003$).

4.1.9 Gift-giving relation correlation between friends and the rest

The number of gift-giving relations with friends correlated with the number of gift-giving relations with the rest of the receivers ($F = 114.0$ on 1, $df = 334$, $p < 0.0001$, $R^2 = 0.25$).

4.1.10 Reciprocity in gift-giving/gift-receiving relations

Gift-giving relations correlated with gift-receiving relations with all persons in general ($F = 1227$, $df = 334$, $p < 0.00001$, $R^2 = 0.79$), with family ($F = 410.5$, $df = 334$, $p < 0.00001$, $R^2 = 0.55$) and with friends ($F = 5068$, $df = 334$, $p < 0.00001$, $R^2 = 0.94$).

Gift-receiving relations subtracted from gift-giving relations for family did not correlate with gift-receiving relations subtracted from gift-giving relations for friends ($F = 0.03$, $df = 334$, $p < 0.86$, $R^2 < 0.00001$).

4.1.11 Self-made gifts

89 out of 336 (25.7%) students gave at least one self-made gift. They reported giving self-made gifts to 231 of 2861 (8.1%) possible receivers (those where they could report whether the gift was self-made or not), 73 were friends and 147 were family members; 78 were near family members and 69 were half-near family members (table 4.5). 47 students at gave least one self-made gift to near family (78 recipients), 30 to half-near (69 recipients) and 40 to friends (73 recipients). The students that made their own gifts, gave these to 2.6 (SD = 2.0) persons, 2.2 (SD = 2.6) friends and 1.8 (SD = 1.3) family members on average.

On average, the students that gave at least one self-made gift to their family gave a proportion of 40.1% self-made gifts to them. The students that gave at least one self-made gift to their friends gave a proportion of 38.2% self-made gifts to them (table 4.5).

The students (14) that gave to *both* near (mean 1.9, SD = 0.7) and half-near (mean 2.6, SD = 1.6) family did not give self-made gifts more often to any of them ($Z = 1.32$, $p = 0.19$). Similarly, the students (13) that gave to both friends (mean 1.8, SD = 0.8) and near (mean 1.9, SD = 1.5) family did not give self-made gifts more often to either of the groups ($Z = 0.29$, $p = 0.77$); and they (12) did not give more to friends (mean 2.0) than half-near (mean 2.5) family ($Z = 0.92$, $p = 0.36$).

The students that gave to near family (47) also gave to half-near family (14) 29.8% of the time and to friends (15) 31.9% of the time. The students that gave to half-near family (30) also gave to near family (14) 46.7% of the time and to friends (12) 40% of the time. The students that gave to friends (40) also gave to near family (15) 37.5% of the time and to half-near family (12) 30% of the time (table 4.6).

Only 1 of the 89 students gave to at least one recipient in *all* of the categories Parents, Siblings, Grandparents, Uncles/Aunts and Friends of table 4.6.

Of the 89 students, 7 gave to at to least one recipient in *all* of the categories Near family, Half-near family and Friends, 14 to both Near family and Half-near family, 15 to both Near family and Friends, and 12 to both Half-near family and Friends.

In general, 50 students gave to only one category. 19 students only gave to Parents, 1 only gave to Siblings, 7 only gave to Grandparents, 3 only gave to Uncles/Aunts and 20 only gave to Friends.

There were negative correlations between the number of gift-giving relations of self-made gifts with siblings and parents ($F = 16.79$, $df = 43$, $p = 0.00001$, $R^2 = 0.28$), grandparents ($F = 24.45$, $df = 31$, $p < 0.00001$, $R^2 = 0.44$), uncles and aunts ($F = 9.95$, $df = 22$, $p = 0.005$, $R^2 = 0.31$); but not with friends ($F = 0.51$, $df = 44$, $p = 0.48$, $R^2 = 0.01$).

There were negative correlations between the number of gift-giving relations of self-made gifts with parents and grandparents ($F = 9.35$, $df = 48$, $p = 0.003$, $R^2 = 0.16$) and friends (F

= 14.87, df = 66, p = 0.0002, R^2 = 0.18); but not with uncles and aunts (F = 0.82, df = 45, p = 0.37, R^2 = 0.02).

There were no correlations between the number of gift-giving relations of self-made gifts with grandparents and uncles and aunts (F = 0.08, df = 28, p = 0.78, R^2 = 0.002) or friends (F = 3.45, df = 52, p = 0.07, R^2 = 0.06).

There was a correlation between the number of gift-giving relations of self-made gifts with uncles and aunts and friends (F = 7.03, df = 47, p = 0.01, R^2 = 0.13).

The number of gift-giving relations from self-made gifts correlated with the number of gift-giving relations in general (F = 46.95, df = 331, p < 0.00001, R^2 = 0.12). This was also true when we tested the students that gave at least one self-made gift (F = 13.01, df = 81, p = 0.00005, R^2 = 0.14).

There was no correlation between income and the number gift-giving relations of self-made gifts (F = 0.15, df = 325, p = 0.69, R^2 = 0.0005, square-root transformed data). However, when grouping the students into gift makers (mean NOK 94,223, SD = 43,534) and non-gift makers (mean NOK 83,149, SD = 34,212), there was a difference in mean income (F = 1.98, df = 328, p = 0.02), with gift-making students earning *more*.

There was no correlation between money spent on Christmas gifts and the number gift-giving relations of self-made gifts (F = 1.17, df = 328, p = 0.28, R^2 = 0.004, square-root transformed data). Nor was there any difference, when grouping the students into gift makers (NOK 1,739, SD = 946) and non-gift makers (NOK 1,558, SD = 853) in mean spending (F = 2.59, df = 328, p = 0.10).

For the gift-making students, the enjoyment in buying or making Christmas gifts did not correlate with the number of self-made gifts given (F = 0.62, df = 81, p = 0.43, R^2 = 0.0008), but when grouping the students into gift makers and non-gift makers, there was an effect (F = 10.37, df = 333, p = 0.001). Students that made at least one gift by themselves reported on average 6.2 (SD = 2.4), and those that did not reported 5.3 (SD = 2.1), on a scale form 1 to 9 in how much they enjoyed making or buying Christmas gifts.

4.1.12 Gifts procured single-handedly

Only 53 of the 336 students (16%) bought or made all the Christmas gifts by themselves. Of the students that gave assisted gifts, 262 gave to family and 92 gave to friends (a student may be in both of these groups). The average number of people assisting in gift buying were 3.5 (SD = 2.9) in total (29%), 0.7 (SD = 1.4) to friends (29%) and 2.8 (SD = 2.4) to family (83%). The number of assistants when giving to family were many more than when giving to friends (Z = 4.25, p < 0.00001).

When grouping the students into solitary gift givers and assisted gift givers, there was no effect of enjoyment in buying or making gifts (F = 0.14, df = 331, p = 0.71).

Table 4.1. Overview of some of the gift relations of the study population

Explanation/ Relations	Gift-giving relations	Gift-receiving relations	Gifts given	Gifts received	Reciprocity per relation[3]	Reciprocity per gift[4]
Mothers	315	329	317	581	0.96	0.55
Fathers	299	311	300	494	0.96	0.61
Siblings	506	483	708	692	1.05	1.02
Children	16	-	47	-		
Grandparents	424	485	290	543	0.87	0.53
Nephews/Nieces	132	-	166	-		
Uncles	99	254	116	311	0.39	0.37
Aunts	79	194	101	249	0.41	0.41
Cousins	217	-	241	-		
Friends	788	705	995	705 [5]	1.12	-
Partners	162	147	276	254	1.10	1.09
Step-parents	39	43	31	61	0.91	0.51
Others	937	-	766	-	-	-
Sum	4013	2951	4355	3889	-	-
Sum (adj)[1]	2711	-	3135	-	-	-
Mean	11.9 SD = 6.0	8.8 SD = 3.7	13.0 SD = 7.4	11.6 SD = 5.5	0.86[2] SD = 0.28	0.72[2] SD = 0.36
Mean (adj) [1]	8.1 SD = 3.5	-	9.3 SD = 5.2	-	-	-

[1] Sum and mean of gift-giving relations and gifts given adjusted to have the same categories of recipients as gift-receiving relations and gift received.
[2] Adjusted means.
[3] Gift-giving relations divided by gift-receiving relations.
[4] Gifts given divided by gifts received.
[5] No data. Assuming at least one gift per gift-receiving relation. The number of gifts given might be lower than gift-giving relations if other persons were in on the gift.

Table 4.2. Mean and mode for gift-giving relations, gift-receiving relations, gifts given and gifts received

Explanation/ Relations	Gift-giving relations		Gift-receiving relations		Gifts given[1]		Gifts received[1]	
	Mode	Mean	Mode	Mean	Mode	Mean	Mode	Mean
Mothers	1	0.94	1	0.98	1	0.95	1	1.72
Fathers	1	0.89	1	0.93	1	0.89	1	1.47
Siblings	1	1.51	1	1.44	1	1.68	1	2.06
Children	0	0.05	-	-	0	0.06	-	-
Grandparents	0	1.26	1	1.44	0	0.86	0	1.61
Nephews/Nieces	0	0.39	-	-	0	0.35	-	-
Uncles	0	0.24	0	0.58	0	0.16	0	0.74
Aunts	0	0.29	0	0.76	0	0.21	0	0.92
Cousins	0	0.24	-	-	0	0.24	-	-
Friends	0	2.34	0	2.10	0	2.52	0	2.10[2]
Partners	0	0.48	0	0.44	0	0.82	0	0.76
Step-parents	0	0.12	0	0.13	0	0.09	0	0.18
Others	0	2.79	-	-	0	2.28	-	-

[1] The number of gifts given/received might be lower than gift-giving/receiving relations if other persons were in on the gift.
[2] No data. Assuming one gift per gift-receiving relation.

Table 4.3. Money spent and received on Christmas gifts

Explanation/ Relations	Money spent on category (NOK) [4]	Money received from category (NOK) [4]	Money spent per receiver (NOK)	Money spent per gift (NOK)	Money received per giver (NOK)	Money received per gift (NOK)	Reci-procity per person[2]	Reci-procity per gift[2]
Mothers	209	1048	221	141	1048	600	0.21	0.23
Fathers	184	930	202	123	930	616	0.22	0.20
Siblings	319	426	198	141	277	193	0.71	0.73
Children	361	-	385	385	-	-	-	-
Grandparents	124	936	80	65	529	472	0.15	0.14
Nephews/Nieces	-	-	118	94	-	-	-	-
Uncles	31	166	93	79	193	157	0.48	0.50
Aunts	20	123	72	57	185	144	0.39	0.39
Cousins	-	-	192	181	-	-	-	-
Friends	249	-	106	84	-	-	-	-
Partners	837	807	837	489	889	514	0.94	0.95
Step-parents	82	564	96	72	603	425	0.16	0.17
Mean	241[1] SD=239	625[1] SD=360	159 SD=117	154 SD=116	619 SD=589	381 SD=364	0.41[1] SD=0.30	0.41[1] SD=0.29
Mean (adj) [3]	-	-	229 SD=170	220 SD=198	-	-	-	-

[1] Adjusted means.
[2] Money spent per receiver or money spent per gift given divided by money received per giver or money received per gift.
[3] Mean of money spent per receiver and money spent per gift adjusted to have the same categories of recipients as money received per giver and money received per gift.
[4] The total amount of money a student spent on/received from a specific relation category divided by the number of *students that could have* given to/received from that category (see column "potential persons" table 4.4).

Table 4.4. Number of students that gave to at least one person in the categories listed

Explanation/ Relation	Students that gave to at least one person in the relation-category	Students that received from at least one person in the relation-category	Potential persons[1]	Reciprocity per category[2]
Mothers	315	329	332	0.96
Fathers	299	311	327	0.96
Siblings	304	298	314	1.02
Children	16	-	16	-
Grandparents	218	244	274	0.89
Nephews/Nieces	63	-	69	-
Uncles	77	165	294	0.47
Aunts	64	140	293	0.46
Cousins	93	-	291	-
Friends	222	215	336[3]	1.03
Partners	146	147	162	0.99
Step-parents	39	43	46	0.91

[1] The number of students that could give to, or receive from, at least one person in the specific relation category.
[2] Students that gave to at least one person in the relation-category divided by students that received from at least one person in the relation-category.
[3] Assuming every student has at least one friend.

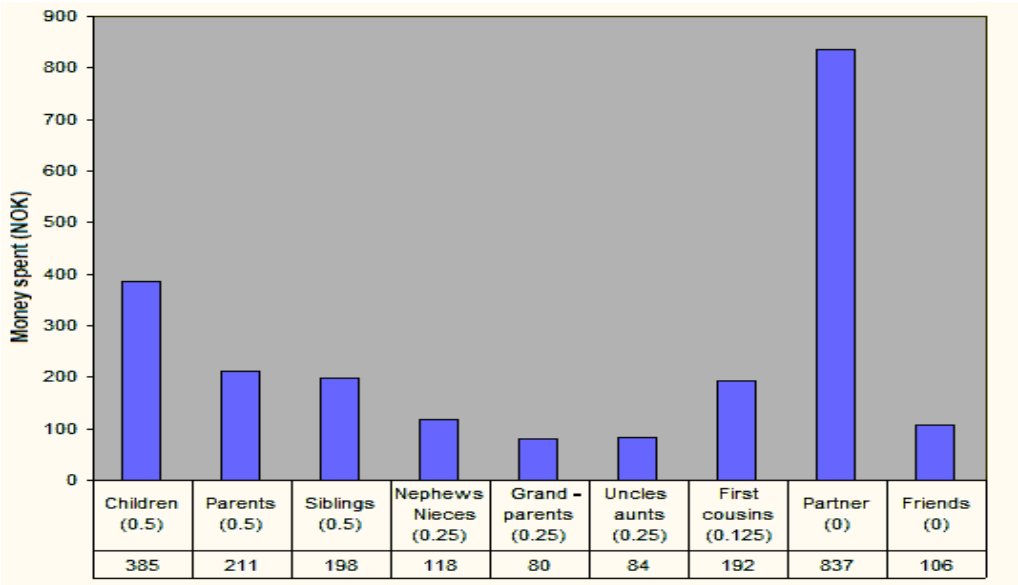

Figure 4.1. Money spent per recipient of category of relationship ordered from left to right after the coefficient of relatedness (r).

Table 4.5. Gift-giving relations with self-made gifts

Recipient category	Number of recipients	Percentage of gift-giving relations in category from self-made gifts	Percentage of self-made gifts from gift-making students	Mean recipient in category
Mother	30	9.1%	-	-
Father	28	9.0%	-	-
Sisters	10	4.4%	83.3%	-
Brothers	8	3.2%	80.0%	-
Siblings	18	3.6%	69.2%	1.4
Children	2	12.5%	-	-
Grandparents	42	9.9%	87.5%	1.9
Uncles	15	15.2%	100.0%	1.3
Aunts	12	15.2%	80.0%	1.2
Genetic family	147	7.4%	40.1%	2.3
Near family	78	8.5%	51.3%	1.7
Half-near family	69	11.5%	77.5%	2.3
Female friends	48	8.7%	44.0%	1.7
Male friends	25	11.1%	56.5%	1.5
Friends	73	9.3%	38.2%	1.8
Partner	10	6.0%	-	-
Total	**231**	**8.1%**	**25.7%**	**2.6**

*Table 4.6. Number of students giving self-made gifts to categories of recipients**

Gave to/ Gave also to	Parents	Siblings	Grand-parents	Uncles/ aunts	Near family	Half-near family	Friends
Parents	**38**	6	10	8	**-**	11	10
Siblings	6	**13**	2	6	-	6	7
Grandparents	10	2	**22**	9	10	-	8
Uncles/Aunts	8	4	9	**17**	8	-	8
Near family	-	-	10	11	**47**	14	15
Half-near family	11	6	-	-	14	**30**	12
Friends	10	7	8	8	15	12	**40**

*The table is read horizontally. For example, reading parents: Among the 38 students that gave at least one self-made gift to a parent, 6 also gave at least one self-made gift to a sibling, 10 to grandparents etc.

4.2 Kin, partners and friends

In this section we focus on who the students gave to and their general gift-relations with these persons. We look at the effects living together, spending Christmas together, emotional relation, age and frequency of encounters have on money spent and received; and self-made gifts.

4.2.1 Gift-giving and gift-receiving relations with family, partner and friends

All students gave to at least one family member, and all students with children gave to at least one of them. The other categories of receivers were more sporadically given to.

The students had 1136 (mean 3.4) gift-giving relations with near family, 951 (mean 2.4) with half-near family, and 788 (mean 2.3) with friends (summarized from tables 4.1 and 4.2). They had more gift-giving relations with their near family than their half-near family ($t = 7.44$, $df = 335$, $p < 0.0001$) and than with their friends ($t = 6.64$, $df = 335$, $p < 0.0001$); and they had more gift-giving relations with their half-near family than with their friends ($Z = 2.21$, $p = 0.03$).

They gave 1372 (mean 3.6) gifts to near family, 914 (mean 1.8) to half-near family, and 995 (mean 2.5) to friends (summarized from tables 4.1 and 4.2). They gave more gifts to their near family than their half-near family ($t = 10.08$, $df = 335$, $p < 0.0001$) and than their friends ($Z = 7.24$, $p < 0.0001$); but there were no difference between half-near family and friends ($Z = 1.49$, $p = 0.14$).

The students had 1123 (mean 3.4) gift-receiving relations with near family, 933 (mean 2.8) with half-near family, and 705 (mean 2.1) with friends (tables 4.1 and 4.2). They had more gift-receiving relations with their near family than their half-near family ($t = 4.61$, $df = 335$, $p < 0.0001$) and than with their friends ($t = 8.71$, $df = 335$, $p < 0.0001$); and they had more gift-receiving relations with their half-near family than with their friends ($Z = 5.25$, $p < 0.0001$).

They received 1767 (mean 5.3) gifts from near family, 1103 (mean 3.3) to half-near family, and 705 (mean 2.1) to friends (tables 4.1 and 4.2). We did not record the number of gifts from friends, so they are conservatively set to one from each friend that gave. They received more gifts from their near family than their half-near family ($t = 10.24$, $df = 335$, $p < 0.0001$).

Based on the percentage of students giving to at least *one* recipient of a group from the potential recipients of that group, they gave to siblings (97%), mothers (95%), fathers (91%), nieces/nephews (91%), partners (90%), step-parents (85%), grandparents (80%), friends (66%), cousins (32%), uncles (26%) and aunts (22%) in this order (calculated from

table 4.4). Grouping the family results into near family and half-near family, we get 99.7% for near family and 83.6% for half-near family.

Similarly, based on the percentage of students receiving from at least *one* giver of a group from the potential givers of that group, they got from mothers (99%), fathers (95%), siblings (95%), step-parents (93%), partners (91%), grandparents (89%), friends (64%), uncles (56%) and aunts (48%) in this order (calculated from table 4.4). We did not have data for gift-receiving from children, nieces/nephews or cousins. Grouping the family results into near family and half-near family, we get 99.7% for near family and 87.5% for half-near family.

4.2.2 Value of gifts to family, partner and friends

Regarding near family, the students that had children spent more ($Z = 2.13$, $p = 0.03$) on children (NOK 385, SD = 294) than on their parents (NOK 187, SD = 214), and more ($Z = 3.21$, $p = 0.001$) than on siblings (NOK 106, SD = 121). The students did not spend more ($t = 1.62$, $df = 313$, $p = 0.11$, square root-transformed data) on siblings (NOK 212, SD = 157) than on their parents (NOK 196, SD = 159).

The students spent more ($Z = 3.26$, $p = 0.001$) on their nephews/nieces (NOK 134, SD = 105) than on their grandparents (NOK 61, SD = 68). They spent more ($Z = 8.79$, $p < 0.0001$) on their grandparents (NOK 68, SD = 82) than on their uncles/aunts (NOK 24, SD = 46). The students that spent both on nephews/nieces (NOK 95, SD = 58) and first cousins (NOK 56, SD = 49), spent near-significant more on nephews/nieces ($Z = 1.82$, $p = 0.07$). There was no difference ($Z = 0.21$, $p = 0.83$) between spending on grandparents (NOK 97, SD = 121) and first cousins (NOK 91, SD = 69).

Those students that gave to both partner (NOK 437, SD = 308) and children (NOK 385, SD = 294) did not show a significant difference in spending between these ($Z = 0.23$, $p = 0.82$), but showed a significant difference ($p < 0.05$) between partner and all the other groups, with students spending more on partner. Students did not spend significantly more on friends than any of the other groups ($p > 0.05$ for all).

The most expensive gift was given to parents 70%, children 19%, siblings 11%, grandparents 5%, nephews and nieces 4%, uncles and aunts 2%, first cousins 2% of the time when these categories of relationships were possible. When non-kin were added, partners received the most expensive gift 48% and friends 2% of the time.

The students gave on average gifts worth more than the average gift (NOK 154) 88% of the time to their parents, 80% to their partners, 75% to their children, 55% to their siblings, 28% to their nephews and nieces, 24% to their grandparents, 13% to their friends, 12% to their uncles and aunts and first cousins.

4.2.3 Value of gifts from family and partner

Regarding near family, the students received more ($t = 10.36$, $df = 313$, $p < 0.0001$, log-transformed data) from parents (NOK 1022, SD = 1264) than from their siblings (NOK 281, SD = 306), in fact the students received more from their parents than any other family group ($p < 0.0001$ for all). The students received more ($Z = 4.67$, $p < 0.0001$) from their grandparents (NOK 426, SD = 360) than their siblings (NOK 279, SD = 307). They received more ($Z = 9.47$, $p < 0.0001$) from their siblings (NOK 273, SD = 279), than from their aunts/uncles (NOK 125, SD = 145).

Those students that had partners, received more ($Z = 2.45$, $p = 0.01$) from their parents (NOK 1009, SD = 1159) than they did from their partner (NOK 703, SD = 613). Students received more ($p < 0$ .0002) from their partners than from any of the other groups.

The most expensive gift was received from parents 57%, grandparents 23%, siblings 8% and uncles/aunts 3%, of the time when these categories of relationships were possible. When non-kin were added, partners gave the most expensive gift 30% of the time.

The students received on average gifts worth more than the average gift (NOK 619) 38% of the time from their parents, 17% from their grandparents, 14% from their partners, 2% from their siblings and 0.6% from their uncles and aunts.

4.2.4 Gift-giving dynamics within the family, with partner and with friends

The correlations between gift-giving relations and gift-receiving relations were for friends ($F = 5068$, $df = 334$, $p < 0.00001$, $R^2 = 0.94$), partner ($F = 1458$, $df = 334$, $p < 0.00001$, $R^2 = 0.81$), siblings ($F = 1708$, $df = 334$, $p < 0.00001$, $R^2 = 0.84$), grandparents ($F = 640.4$, $df = 334$, $p < 0.00001$, $R^2 = 0.66$), parents ($F = 223.7$, $df = 334$, $p < 0.00001$, $R^2 = 0.40$) and uncles/aunts ($F = 122.7$, $df = 334$, $p < 0.00001$, $R^2 = 0.27$) in this order, after R^2.

The correlations between average money spent and average money received were for partner ($F = 384.6$, $df = 333$, $p < 0.00001$, $R^2 = 0.54$), siblings ($F = 163$, $df = 334$, $p < 0.00001$, $R^2 = 0.33$), uncles/aunts ($F = 56.66$, $df = 332$, $p < 0.00001$, $R^2 = 0.15$), grandparents ($F = 13.08$, $df = 334$, $p = 0.00003$, $R^2 = 0.04$) and parents ($F = 3.65$, $df = 332$, $p = 0.06$, $R^2 = 0.01$) in this order, after R^2. The correlation for parents is the only non-significant correlation.

There was a strong correlation ($R^2 = 0.85$, $p = 0.009$) between the mean value of money spent on parents, siblings, grandparents, genetic aunts and genetic uncles, nephews and nieces, and first cousins, and their respective coefficients of relatedness (Figure 4.1).

4.2.5 Money spent and received and living together

Living with mother had a significant effect on the money spent on mother ($t = 3.62$, $df = 326$, $p = 0.003$, square root-transformed data). Money spent when living with mother was on average NOK 250 (SD = 170) and when not NOK 183 (SD = 152).

Living with mother had no effect on money received from mother ($t = 0.47$, $df = 329$, $p = 0.64$, log-transformed data). Money received when living with mother was on average NOK 1055 (SD = 1404) and when not NOK 1051 (SD = 1514).

Living with father had a significant effect on the money spent on father ($t = 4.35$, $df = 320$, $p < 0.0001$, square root-transformed data). Money spent when living with father was on average NOK 245 (SD = 170) and when not NOK 162 (SD = 129).

Living with father had no effect on the money received from father ($t = 1.63$, $df = 321$, $p = 0.10$, log-transformed data). Money received when living with father was on average NOK 994 (SD = 853) and when not NOK 928 (SD = 1159).

Living with oldest sibling had no effect on the money spent on oldest sibling ($Z = 1.11$, $p = 0.27$). Money spent when living with oldest sibling was on average NOK 216 (SD = 153) and when not NOK 191 (SD = 153).

Living with oldest sibling had no effect on the money received from oldest sibling ($Z = 1.18$, $p = 0.24$). Money received when living with oldest sibling was on average NOK 211 (SD = 145) and when not NOK 300 (SD = 258).

Living with youngest sibling had an effect on the money spent on youngest sibling ($Z = 2.73$, $p = 0.006$). Money spent when living with youngest sibling was on average NOK 270 (SD = 181) and when not NOK 203 (SD = 147).

Living with youngest sibling had no effect on the money received from youngest sibling ($Z = 1.10$, $p = 0.27$). Money received when living with youngest sibling was on average NOK 303 (SD = 301) and when not NOK 272 (SD = 349).

4.2.6 Money spent and received and spending Christmas together

Spending Christmas with mother had a significant effect on the money spent on mother ($t = 2.19$, $df = 326$, $p = 0.029$, square root-transformed data). Money spent when spending Christmas with mother was on average NOK 202 (SD = 152) and when not NOK 174 (SD = 207).

Spending Christmas with mother had near-significant effect on money received from mother ($t = 1.91$, $df = 329$, $p = 0.06$, log-transformed data). Money received when spending

Christmas with mother was on average NOK 1098 (SD = 1560) and when not NOK 690 (SD = 577).

Spending Christmas with father had a significant effect on the money spent on father ($t = 3.39$, $df = 320$, $p = 0.0008$, square root-transformed data). Money spent when spending Christmas with father was on average NOK 189 (SD = 145) and when not NOK 133 (SD = 114).

Spending Christmas with father had a significant effect on the money received from father ($t = 3.35$, $df = 321$, $p = 0.0009$, log-transformed data). Money received when spending Christmas with father was on average NOK 1003 (SD = 1157) and when not NOK 653 (SD = 752).

Spending Christmas with oldest sibling had a significant effect on the money spent on that sibling ($Z = 3.36$, $p = 0.0008$). Money spent when spending Christmas with oldest sibling was on average NOK 217 (SD = 158) and when not NOK 137 (SD = 129).

Spending Christmas with oldest sibling had a near-significant effect on the money received from that sibling ($Z = 1.89$, $p = 0.06$). Money received when spending Christmas with oldest sibling was on average NOK 326 (SD = 273) and when not NOK 238 (SD = 195).

Spending Christmas with youngest sibling had a significant effect on the money spent on that sibling ($Z = 2.03$, $p = 0.04$). Money spent when spending Christmas with youngest sibling was on average NOK 301 (SD = 387) and when not NOK 216 (SD = 256).

Spending Christmas with youngest sibling had a significant effect on the money received from that sibling ($Z = 3.30$, $p = 0.001$). Money received when spending Christmas with youngest sibling was on average NOK 211 (SD = 136) and when not NOK 167 (SD = 173).

Spending Christmas with mother's mother had a significant effect on the money spent on her ($Z = 4.45$, $p < 0.0001$). Money spent when spending Christmas with mother's mother was on average NOK 102 (SD = 106) and when not NOK 56 (SD = 62).

Spending Christmas with mother's mother had a significant effect on the money received from her ($Z = 5.11$, $p < 0.0001$). Money received when spending Christmas with mother's mother was on average NOK 618 (SD = 535) and when not NOK 324 (SD = 367).

Spending Christmas with father's mother had a significant effect on the money spent on her ($Z = 4.56$, $p < 0.0001$). Money spent when spending Christmas with father's mother was on average NOK 99 (SD = 83) and when not NOK 47 (SD = 51).

Spending Christmas with father's mother had a significant effect on the money received from her ($Z = 2.80$, $p = 0.005$). Money received when spending Christmas with father's mother was on average NOK 564 (SD = 574) and when not NOK 316 (SD = 375).

4.2.7 Money spent and received and emotional relation

Emotional relation with mother neither correlated with money spent on Christmas gifts to her ($F = 1.30$, $df = 332$, $p = 0.29$ and $R^2 = 0.003$) nor with money received on Christmas gifts from her ($F = 0.73$, $df = 332$, $p = 0.07$ and $R^2 = 0.01$).

Emotional relation with father did correlate with money spent on Christmas gifts to him ($F = 12.27$, $df = 332$, $p = 0.0005$, $R^2 = 0.04$) and with money received on Christmas gifts from him ($F = 3.85$, $df = 331$, $p = 0.05$, $R^2 = 0.01$).

Emotional relation with mother's mother neither correlated with money spent on her ($F = 1.57$, $df = 177$, $p = 0.21$, $R^2 = 0.009$) nor with money received from her ($F = 1.66$, $df = 177$, $p = 0.20$, $R^2 = 0.009$).

Emotional relation with father's mother neither correlated with money spent on her ($F = 1.01$, $df = 164$, $p = 0.32$, $R^2 = 0.006$) nor with money received from her ($F = 0.76$, $df = 161$, $p = 0.39$, $R^2 = 0.005$).

In sibships with three siblings, money spent on sibling closest to heart (mean NOK 178, SD = 131) was different ($Z = 5.00$, $p < 0.0001$) from money spent on the other sibling (mean NOK 105, SD = 133).

4.2.8 Money spent and received and age

There was no correlation between mother's age and money spent on mother ($F = 1.15$, $df = 326$, $p = 0.25$ and $R^2 = 0.0004$) or student's age and money spent on mother ($F = 0.02$, $df = 331$, $p = 0.88$ and $R^2 < 0.0001$).

There was no correlation between mother's age and money received from mother ($F = 1.35$, $df = 327$, $p = 0.25$ and $R^2 = 0.0004$) or student's age and money received from mother ($F = 0.97$, $df = 332$, $p = 0.33$ and $R^2 = 0.003$).

There was no correlation between father's age and money spent on father ($F = 0.40$, $df = 315$, $p = 0.69$ and $R^2 = 0.0005$) or student's age and money spent on father ($F = 2.63$, $df = 331$, $p = 0.11$ and $R^2 = 0.0008$).

There was no correlation between father's age and money received from father ($F = 1.07$, $df = 316$, $p = 0.30$ and $R^2 = 0.003$), but there was a correlation between student's age and money received from father ($F = 11.26$, $df = 332$, $p = 0.0009$ and $R^2 = 0.03$).

There was no correlation between student's age and money spent on ($F = 0.01$, $df = 157$, $p = 0.92$ and $R^2 < 0.0001$) or received from oldest sibling ($F = 0.74$, $df = 150$, $p = 0.39$ and $R^2 = 0.005$).

There was no correlation between student's age and money spent on ($F = 0.008$, $df = 226$, $p = 0.93$ and $R^2 < 0.0001$) or received from youngest sibling ($F = 0.53$, $df = 208$, $p = 0.47$ and $R^2 = 0.003$).

There was no correlation between student's age and money spent on mother's mother ($F = 0.03$, $df = 179$, $p = 0.88$ and $R^2 = 0.0001$), nor was there any correlation between age of mother's mother and money spent on her ($F = 1.48$, $df = 169$, $p = 0.23$ and $R^2 = 0.009$).

There was no correlation between student's age and money received from mother's mother ($F = 3.0$, $df = 179$, $p = 0.08$ and $R^2 < 0.02$, log-transformed data), nor was there any correlation between age of mother's mother and money received from her ($F = 0.09$, $df = 172$, $p = 0.77$ and $R^2 = 0.0005$, log-transformed data).

There was no correlation between student's age and money spent on father's mother ($F = 0.47$, $df = 179$, $p = 0.49$ and $R^2 = 0.0003$, square root-transformed data), nor was there any correlation between age of father's mother and money spent on her ($F = 1.32$, $df = 154$, $p = 0.25$ and $R^2 = 0.009$, square root-transformed data).

There was no correlation between student's age and money received from father's mother ($F = 0.26$, $df = 176$, $p = 0.61$ and $R^2 = 0.002$, square root -transformed data), nor was there any correlation between age of father's mother and money received from her ($F = 0.04$, $df = 153$, $p = 0.84$ and $R^2 = 0.0003$, square root-transformed data).

4.2.9 Money spent and received and frequency of encounters

How often the student met oldest sibling correlated with money spent on ($F = 13.22$, $df = 159$, $p = 0.0004$, $R^2 = 0.08$, square root-transformed data) and received from that sibling ($F = 8.25$, $df = 151$, $p = 0.005$, $R^2 = 0.05$, log-transformed data).

How often the student met youngest sibling correlated with money spent on ($F = 5.21$, $df = 190$, $p = 0.02$, $R^2 = 0.03$, square root-transformed data) and received from that sibling ($F = 6.35$, $df = 173$, $p = 0.01$, $R^2 = 0.04$, square-transformed data).

How often the student met mother's mother correlated with money spent ($F = 24.4$, $df = 177$, $p = 0.0008$, $R^2 = 0.06$, log-transformed data) and received from her ($F = 29.58$, $df = 177$, $p < 0.0001$, $R^2 = 0.04$, log-transformed data).

How often the student met father's mother correlated with money spent on ($F = 7.11$, $df =$

179, p = 0.008, R^2 = 0.04, square root-transformed data) and received from her (F = 13.65, df = 176, p < 0.0001, R^2 = 0.07, square root-transformed data).

How often the female student met their female friend (the one they listed first among their female friend gift-receivers) correlated with money spent on her (F = 35.14, df = 166, p < 0.0001, R^2 = 0.18).

How often the male student met their male friend (the one they listed first among their male friend gift-receivers) correlated with money spent on him (F = 39.32, df = 163, p < 0.0001, R^2 = 0.20).

4.2.10 Self-made gifts and living with

Living with mother had no effect on whether a self-made gift was given to her or not (χ^2 = 0.05, p = 0.83). The proportions of gift-giving relations from self-made gifts were 6/71 when living with mother, and 24/230 when not.

Living with father had no effect on whether a self-made gift was given to him or not (χ^2 = 1.03, p = 0.31). The proportions of gift-giving relations from self-made gifts were 3/61 when living with mother, and 25/234 when not.

4.2.11 Self-made gifts and spending Christmas

Spending Christmas with mother had no effect on whether a self-made gift was given to her or not (χ^2 = 0.04, p = 0.85). The proportions of gift-giving relations from self-made gifts were 26/268 when spending Christmas with mother, and 4/31 when not.

Spending Christmas with father had no effect on whether a self-made gift was given to him or not (χ^2 = 1.03, p = 0.31). The proportions of gift-giving relations from self-made gifts were 25/234 when spending Christmas with father, and 3/51 when not.

Spending Christmas with mother's mother had no effect on whether a self-made gift was given to her or not (χ^2 = 1.30, p = 0.25). The proportions of gift-giving relations from self-made gifts were 22/244 when spending Christmas with mother's mother, and 6/51 when not.

Spending Christmas with father's mother had no effect on whether a self-made gift was given to her or not (χ^2 = 1.31, p = 0.25). The proportions of gift-giving relations from self-made gifts were 2/37 when spending Christmas with father's mother, and 12/74 when not.

4.2.12 Self-made gifts and emotional relation

Emotional relation with mother had no effect on whether a self-made gift was given to her or not ($Z = 0.10$, $p = 0.92$). The students that gave a self-made gift to mother had on average 7.15 (SD = 1.53) in emotional relations with her and those that did not had 7.07 (SD = 1.68).

Emotional relation with father had no effect on whether a self-made gift was given to him or not ($Z = 0.75$, $p = 0.46$). The students that gave a self-made gift to father had on average 6.81 (SD = 1.86) in emotional relations with him and those that did not had 6.36 (SD = 2.36).

Emotional relation with mother's mother had no effect on whether a self-made gift was given to her or not ($Z = 1.69$, $p = 0.09$). The students that gave a self-made gift to mother's mother had on average 8.07 (SD = 1.60) in emotional relations with her and those that did not had 7.34 (SD = 1.21).

Emotional relation with father's mother had no effect on whether a self-made gift was given to her or not ($Z = 0.12$, $p = 0.91$). The students that gave a self-made gift to mother's mother had on average 6.79 (SD = 2.11) in emotional relations with her and those that did not had 6.50 (SD = 1.33).

4.2.13 Self-made gifts and frequency of encounters

How often the student met mother's mother had no effect on whether a self-made gift was given to her or not ($F = 0.66$, $df = 135$, $p = 0.42$, log-transformed data). The students that gave self-made gifts to mother's mother saw her on average 44 (SD = 65) days a year, those who didn't 33 (SD = 60).

How often the student met father's mother had no effect on whether a self-made gift was given to her ($F = 1.88$, $df = 128$, $p = 0.17$, log-transformed data). The students that gave self-made gifts to father's mother saw her on average 16 (SD = 22) days a year, those who didn't 24 (SD = 44).

How often the female students met their female friend (the one they listed first among their female friend gift-receivers) had no effect on whether a self-made gift was given to her ($Z = 0.36$, $p = 0.72$). The female students who gave a self-made gift to their female friend saw her on average 135 (SD = 113) days a year, those who didn't 137 (SD = 127).

How often the male students met their male friend (the one they listed first among their male friend gift-receivers) had no effect on whether a self-made gift was given to him ($Z = 0.14$, $p = 0.89$). The male students who gave a self-made gift to their male friend saw him on average 95 (SD = 66) days a year, those who didn't 119 (SD = 101).

4.3 Civil status

The students were grouped into four categories of civil status, called Married, Cohabiting, Partner and Single. For every test we conducted on civil status we checked for confounding effects of sex and age, neither showed interaction with civil status in any category.
In the following section, we report the group differences of civil status in gift-relations, the enjoyment in buying or making Christmas gifts, self-made gifts and self-procured gifts, and reciprocity in giving and receiving.

4.3.1 Gift-giving relations

Married had a mean of 16.4 (SD = 8.3), Cohabiting 15.7 (SD = 6.1), Partner 12.5 (SD = 5.5) and Single 9.6 (SD = 4.5) gift-giving relations.

There were effects of civil status on gift-giving relations ($F = 26.99$, $df = 332$, $p < 0.0001$, square-root transformed data), and this was true for all pairwise comparisons (Scheffé 0.95 confidence intervals), except between Married/Cohabiting and Cohabiting/Partner: Married had significantly more gift-giving relations than Partner and Single, Cohabiting more than Single and Partner more than single.

Removing partners, partners' family and children from the receivers to not create any bias against single and childless students, Married had a mean of 10.1 (SD = 6.5), Cohabiting 10.0 (SD = 4.6), Partner 10.1 (SD = 4.7) and Single 9.5 (SD = 4.5) gift-giving relations; and all effects of civil status on gift-giving relations disappeared ($F = 0.45$, $df = 332$, $p = 0.72$, square root-transformed data).

Married had 6.6 (SD = 2.8), Cohabiting 6.5 (SD = 2.9), Partner 6.3 (SD = 2.6) and Single 5.9 (SD = 2.6) gift-giving relations with genetic family. There were no effects of civil status ($F = 1.15$, $df = 332$, $p = 0.33$).

Married had 2.2 (SD = 3.5), Cohabiting 1.9 (SD = 2.3), Partner 2.8 (SD = 3.1) and Single 2.4 (SD = 2.6) gift-giving relations with friends. Civil status showed no effect on gift-giving relations with friends (Kruskal-Wallis $\chi^2 = 3.72$, $df = 3$, $p = 0.29$).

4.3.2 Gift-receiving relations

Married had a mean of 7.2 (SD = 4.3), Cohabiting 8.7 (SD = 3.2), Partner 10.0 (SD = 4.0) and Single 8.4 (SD = 3.6) gift-receiving relations. There were group-effects of civil status on gift-receiving relations ($F = 5.30$, $df = 333$, $p = 0.00014$, square-root transformed data).

Pairwise comparisons (Scheffé 0.95 confidence intervals) showed differences between Partner and Married, and Partner and Single: Partner had significantly more gift-receiving relations than Married and Single.

Removing partners (gifts from children or partner's family were not tallied in the questionnaire) from the gift-givers to not create any bias against single students, Married had a mean of 6.6 (SD = 4.1), Cohabiting 7.7 (SD = 3.2), Partner 9.1 (SD = 4.0) and Single 8.4 (SD = 3.6) gift-giving relations. There were still effects of civil status on gift-receiving relations ($F = 4.12$, $df = 333$, $p = 0.00069$, square-root transformed data). Pairwise comparisons (Scheffé 0.95 confidence intervals) showed only difference between Partner and Married: Partner had significantly more gift-receiving relations than Married.

Married had 4.9 (SD = 2.4), Cohabiting 5.9 (SD = 2.1), Partner 6.5 (SD = 2.3) and Single 6.2 (SD = 2.4) gift-receiving relations with genetic family. There were effects of civil status on gift-receiving relations ($F = 3.26$, $df = 332$, $p = 0.022$, square root-transformed data). Pairwise comparisons (Scheffé 0.95 confidence intervals) only showed differences between Partner and Married: Partner had significantly more gift-receiving relations with genetic family than Partner.

Married had 1.6 (SD = 2.3), Cohabiting 1.7 (SD = 2.0), Partner 2.5 (SD = 2.9) and Single 2.1 (SD = 2.4) gift-receiving relations with friends. Civil status showed no effect on gift-receiving relations with friends (Kruskal-Wallis $\chi^2 = 4.20$, $df = 3$, $p = 0.241$).

4.3.3 Gifts given

Married gave a mean of 12.4 (SD = 5.9), Cohabiting 12.2 (SD = 4.9), Partner 12.4 (SD = 6.4) and Single 9.0 (SD = 5.2) Christmas gifts. There were effects of civil status on the number of gifts given ($F = 9.93$, $df = 332$, $p < 0.0001$, square-root transformed data), and this was true for pairwise comparisons (Scheffé 0.95 confidence intervals) between Partner and Single; and Cohabiting and Single: Single gave significantly less Christmas gifts than either Partner or Cohabiting.

Removing partners, partners' family and children from the receivers to not create any bias against single and childless students, Married gave a mean of 7.8 (SD = 4.6), Cohabiting 7.7 (SD = 4.6), Partner 9.6 (SD = 6.1) and Single 9.0 (SD = 5.2) Christmas gifts. There were no group differences ($F = 1.87$, $df = 332$, $p = 0.13$, square root-transformed data).

Married gave 5.0 (SD = 2.2), Cohabiting 5.0 (SD = 2.9), Partner 5.9 (SD = 3.6) and Single 5.8 (SD = 3.1) gifts to genetic family (without children). There was no effect ($F = 1.47$, $df = 332$, $p = 0.22$) of civil status.

Married gave a mean of 2.2 (SD = 3.3), cohabiting 1.9 (SD = 2.3), partners 3.0 (SD = 3.4) and single 2.6 (SD = 3.0) Christmas gifts to friends. Civil status showed no effect on gifts given to friends (Kruskal-Wallis $\chi^2 = 4.34$, $df = 3$, $p = 0.23$).

Gifts received

Married received on average 9.7 (SD = 6.5), Cohabiting 11.4 (SD = 6.0), Partner 13.0 (SD = 5.2) and Single 11.2 (SD = 5.2) Christmas gifts. There were effects of civil status on the number of gifts received ($F = 4.16$, $df = 332$, $p = 0.007$, square-root transformed data), and this was true for pairwise comparisons (Scheffé 0.95 confidence intervals) between Partner and Married, showing Partner receiving more.

When partners was removed from the gift-givers, Married received on average 8.6 (SD = 6.2), Cohabiting 9.9 (SD = 5.5), Partner 11.5 (SD = 4.9) and Single 11.2 (SD = 5.2) Christmas gifts. The effect of civil status on the number of gifts received was still significant ($F = 4.00$, $df = 332$, $p = 0.008$, square-root transformed data), but when the pairwise comparisons (Scheffé 0.95 confidence intervals) were conducted, the effect of civil status had disappeared.

Married received on average 6.3 (SD = 3.6), Cohabiting 7.2 (SD = 4.2), Partner 8.0 (SD = 3.2) and Single 7.9 (SD = 3.8) Christmas gifts from genetic family. There were no group differences ($F = 2.15$, $df = 332$, $p = 0.09$, square root-transformed data).

Married received on average 1.6 (SD = 2.3), Cohabiting 1.7 (SD = 2.0), Partner 2.5 (SD 2.9) and Single 2.1 (SD = 2.4) Christmas gifts from friends. Civil status showed no effect on gifts given to friends (Kruskal-Wallis $\chi^2 = 4.20$, $df = 3$, $p = 0.24$).

4.3.4 Money spent per gift

Married spent NOK 166 (SD = 87), Cohabiting NOK 181 (SD = 127), Partner NOK 181 (SD = 110) and Single NOK 169 (SD = 98) on average per Christmas gift, after removing outlier NOK 60,182 and NOK 29 from Single, NOK 26 from Cohabiting, NOK 1,274 from Partner and NOK 1,768 from Married. There were no group-effects of civil status on average spending per Christmas gift ($F = 0.44$, $df = 327$, $p = 0.73$, log-transformed data).

When partners, partners' family and children were removed fro the receivers, Married spent NOK 214 (SD = 199), Cohabiting spent NOK 168 (SD = 99), Partner spent NOK 162 (SD = 128) and Single spent NOK 169 (SD = 98) on average per Christmas gift. There were still no effects of civil status on average spending per Christmas gift ($F = 1.02$, $df = 327$, $p = 0.38$, log-transformed data).

Married spent NOK 175 (SD = 124), Cohabiting NOK 179 (SD = 111), Partner NOK 204 (SD = 194) and Single NOK 195 (SD = 115) per Christmas gifts to genetic family. There was no effect of civil status on spending per Christmas gift on genetic family ($F = 0.68$, $df = 332$, $p = 0.56$, log-transformed data).

Married spent NOK 108 (SD = 74), Cohabiting NOK 107 (SD = 65), Partner NOK 105 (SD = 59) and Single NOK 113 (SD = 62) per Christmas gift to friends, after removing the non givers and outliers NOK 220,100 and NOK 633 from Single and NOK 1800 and NOK 450 from Partner. Civil status showed no effect on spending on friends ($F = 0.29$, $df = 213$, $p = 0.84$).

4.3.5 Money spent per receiver

Married spent NOK 147 (SD = 141), Cohabiting NOK 145 (SD = 105), Partner NOK 175 (SD = 87) and Single NOK 149 (SD = 83) on average per receiver, after removing outlier NOK 45,972 from Single, NOK 1075 and NOK 20 from Partner, NOK 1081 from Married and NOK 18 from Cohabiting. There were group-effects of civil status on average spending per receiver ($F = 3.93$, $df = 327$, $p = 0.009$, log-transformed data). Pairwise comparisons showed only Partner spending more money per receiver than Cohabiting (Scheffé 0.95 confidence intervals).

When removing children, partners and partners' family from the receivers, Married spent NOK 146 (SD = 145), Cohabiting NOK 116 (SD = 76), Partner NOK 139 (SD = 79) and Single NOK 149 (SD = 83) on average per receiver. There is also a difference ($F = 5.09$, $df = 327$, $p = 0.002$, log-transformed data), but now only between Single and Cohabiting, showing Single spending more (Scheffé 0.95 confidence intervals).

Married spent NOK 168 (SD = 185), Cohabiting NOK 135 (SD = 88), Partner NOK 168 (SD = 136) and Single NOK 178 (SD = 102) on Christmas gifts per genetic family member (without children). There were effects of civil status on spending per genetic family member ($F = 5.40$, $df = 332$, $p = 0.001$, log-transformed data), only showing Single spending more than Cohabiting (Scheffé 0.95 confidence intervals).

Married spent NOK 117 (SD = 76), Cohabiting NOK 106 (SD = 58), Partner NOK 112 (SD = 64) and Single NOK 120 (SD = 60) per friend, after removing the non givers and outliers NOK 183,417, NOK 475 and NOK 425 from Single and NOK 450 from Partner. Civil status showed no effect on spending per friend ($F = 0.72$, $df = 213$, $p = 0.54$).

4.3.6 Money spent in total

Married spent NOK 1861 (SD = 827), Cohabiting NOK 1882 (SD = 858), Partner NOK 1996 (SD = 1037) and Single NOK 1275 (SD = 682) in total on Christmas gifts. There were group effects of civil status on spending ($F = 18.41$, $df = 327$, $p < 0.0001$, square-root transformed data). Pairwise comparisons (Scheffé 0.95 confidence intervals) showed differences between Single and all the other groups: Single spent significantly less on Christmas gifts in total than Partner, Cohabiting or Married.

Removing partners and children from the receivers, Married spent NOK 1,135 (SD = 719), Cohabiting NOK 1,031 (SD = 579), Partner NOK 1,286 (SD = 747) and Single NOK 1,275 (SD = 682) on Christmas gifts. There were group effects of civil status on spending ($F = 2.62$, $df = 327$, $p = 0.05$, square-root transformed data); however, pairwise comparisons (Scheffé 0.95 confidence intervals) showed no significant group differences.

Married spent NOK 829 (SD = 526), Cohabiting NOK 799 (SD = 476), Partner NOK 978 (SD = 637) and Single NOK 961 (SD = 505) on Christmas gifts to genetic family (without children), after removing outlier NOK 6597 and NOK 75 from Single. The effect of civil status on spending was almost statistically significant ($F = 2.31$, $df = 330$, $p = 0.076$, log-transformed data).

Married spent NOK 238 (SD = 415), Cohabiting NOK 175 (SD =215), Partner NOK 286 (SD = 334) and Single NOK 265 (SD = 311) on Christmas gifts to friends, after removing outlier NOK 550,250 from Single. Civil status showed no effect on spending to friends (Kruskal-Wallis $\chi^2 = 4.56$, $df = 3$, $p = 0.21$).

Civil status showed no effect on spending on partner (Kruskal-Wallis $\chi^2 = 5.66$, $df = 3$, $p = 0.13$) for the three groups Married, mean NOK 683 (SD = 651), Cohabiting, mean NOK 794 (SD = 518) and Partner, mean NOK 703 (SD =521).

However, when Married and Partner, mean NOK 699 (SD =545), were grouped together and tested against Cohabiting, mean NOK 793 (SD = 518), there was a difference ($Z = 13.06$, $p < 0.0001$), showing Cohabiting spending more money on partner than either Married or Partner.

Money spent on and money received from partner by Married did not correlate ($F = 2.16$, $df = 17$, $p = 0.16$, $R^2 = 0.11$); Cohabiting did correlate ($F = 20.6$, $df = 69$, $p < 0.00001$, $R^2 = 0.23$) as did Partner ($F = 66.95$, $df = 77$, $p < 0.00001$, $R^2 = 0.47$).

4.3.7 Enjoyment in buying or making Christmas gifts

Reporting the enjoyment in buying or making Christmas gifts, measured on a scale from 1 to 9, Married gave a mean rating of 6.0 (SD = 2.3), Cohabiting 5.6 (SD =2.1), Partner 6.1 (SD = 2.0) and Single 5.2 (SD = 2.3). There were effects of civil status ($F = 2.96$, $df = 331$, $p = 0.032$), and pairwise comparisons (Scheffé 0.95 confidence intervals) showed only a significant difference between Partner and Single; that is, Partner enjoyed buying/making Christmas gifts significantly more than Single.

Correlations with gifts given in total
There was no correlation between enjoyment in buying or making Christmas gifts and the total number of gifts given by married students ($F = 1.95$, $df = 17$, $p = 0.18$, $R^2 = 0.10$, square root-transformed data), but there were for cohabiting students ($F = 27.96$, $df = 69$, $p < 0.0001$, $R^2 = 0.29$, square root-transformed data; after removing one outlier), students

with partners ($F = 1.81$, $df = 77$, $p < 0.0001$, $R^2 = 0.20$, square root-transformed data; after removing one outlier) and single students ($F = 35.69$, $df = 164$, $p < 0.0001$, $R^2 = 0.18$, square root-transformed data; after removing one outlier).

Correlation with gifts given to genetic family
There was no correlation between enjoyment in buying or making Christmas gifts and the total number of gifts given to genetic family by married students ($F = 1.07$, $df = 17$, $p = 0.32$, $R^2 = 0.06$, square root-transformed data), but there wer for cohabiting students ($F = 13.77$, $df = 69$, $p = 0.0004$, $R^2 = 0.17$, square root-transformed data), students with partner ($F = 6.81$, $df = 77$, $p = 0.01$, $R^2 = 0.08$, square root-transformed data) and students ($F = 25.72$, $df = 164$, $p < 0.0001$, $R^2 = 0.14$, square root-transformed data), after removing one outlier.

Correlation with gifts given to friends
There was no correlation between enjoyment in buying or making Christmas gifts and the total number of gifts given to friends by married students ($F = 1.13$, $df = 17$, $p = 0.30$, $R^2 = 0.06$, square root-transformed data), but there was for cohabiting students ($F = 12.5$, $df = 69$, $p = 0.0007$, $R^2 = 0.15$, square root-transformed data), students with partner ($F = 15.09$, $df = 77$, $p = 0.0003$, $R^2 = 0.16$, square root-transformed data) and single students ($F = 15.82$, $df = 164$, $p < 0.0001$, $R^2 = 0.09$, square root-transformed data), after removing one outlier.

4.3.8 Self-made gifts

9 out of 19 (47%) married students, 22 out of 71 (31%) cohabiting students, 20 out of 79 (25%) students with partners and 32 out of 167 (19%) single students made at least one gift. Pearson cross tabulation showed significant independence for all factors ($\chi^2 = 12.14$, $df = 3$, $p = 0.007$), and the percentages of students that had made at least one gift correlated linearly with civil status ($F = 27$, $df = 2$, $p = 0.035$, $R^2 = 0.93$).

4.3.9 Gifts procured single-handedly

3 out of 19 (15.8%) married students, 4 out of 71 (5.6%) cohabiting students, 11 out of 79 (13.9%) students with partners and 35 out of 167 (21.0%) single students single-handedly procured at least one gift. Pearson cross tabulation showed significant independence for all factors ($\chi^2 = 9.07$, $df = 3$, $p = 0.028$).

4.3.10 Reciprocity in gift-giving/gift-receiving relations

Gift-giving relations with all persons correlated with gift-receiving relations with all persons for married students ($F = 255$, $df = 17$, $p < 0.00001$, $R^2 = 0.94$), for cohabiting students ($F = 250.8$, $df = 69$, $p < 0.00001$, $R^2 = 0.79$), for students with partner ($F = 325$, df

= 77, $p < 0.00001$, $R^2 = 0.81$), and for single students ($F = 505.8$, $df = 165$, $p < 0.00001$, $R^2 = 0.75$).

Gift-giving relations with family correlated with gift-receiving relations with family for married students ($F = 49.07$, $df = 17$, $p < 0.00001$, $R^2 = 0.74$), for cohabiting students ($F = 129.2$, $df = 69$, $p < 0.00001$, $R^2 = 0.65$), for students with partner ($F = 68.69$, $df = 77$, $p < 0.00001$, $R^2 = 0.47$), and for single students ($F = 193.1$, $df = 165$, $p < 0.00001$, $R^2 = 0.54$).

Gift-giving relations with friends correlated with gift-receiving relations with friends for married students ($F = 549.7$, $df = 17$, $p < 0.00001$, $R^2 = 0.97$), for cohabiting students ($F = 457.5$, $df = 69$, $p < 0.00001$, $R^2 = 0.87$), for students with partner ($F = 1749$, $df = 77$, $p < 0.00001$, $R^2 = 0.96$), and for single students ($F = 3690$, $df = 165$, $p < 0.00001$, $R^2 = 0.96$)

Gift-giving relations with partner correlated with gift-receiving relations with partner for married students ($F = 10.76$, $df = 17$, $p = 0.004$, $R^2 = 0.39$), for cohabiting students ($F = 48.2$, $df = 69$, $p < 0.00001$, $R^2 = 0.41$), and for students with partner ($F = 71.4$, $df = 77$, $p < 0.00001$, $R^2 = 0.48$).

4.4 Sex differences

In this section, we looked at the differences between male students and female students in their gift-relations, emotional relations to close family, enjoyment in buying or making Christmas gifts, self-made gifts, self-procured gifts; and finally their reciprocity in gift spending and gift receiving.

4.4.1 Gift-giving relations

Women had a mean of 14.3 (SD = 6.1) and a mode of 11; and men had a mean of 9.6 (SD = 4.9) and a mode of 7 gift-giving relations. Women had more gift-giving relations than men ($t = 8.24$, $df = 334$, $p < 0.0001$, log-transformed data).

Looking at genetic family only, women had a mean of 6.2 (SD = 2.6) and men a mean of 5.5 (SD = 2.3) gift-receiving relations; women receiving from more family members than men ($t = 4.92$, $df = 334$, $p < 0.0001$).

Looking at friends only, women had a mean of 3.2 (SD = 2.9) and men a mean of 1.5 (SD = 2.2) gift-giving relations (table 4.7), showing women giving to more friends than men ($Z = 6.56$, $p < 0.0001$).

Table 4.7. Data for gift-giving relations with friends

Sex	n	Total	Mean	Median	Max	Mode	SD
Female	168	540	3.2	3	14	0	2.9
Male	168	248	1.5	1	16	0	2.2
Both	**336**	**788**	**2.4**	**1**	**-**	**0**	**2.7**

Table 4.8. Data for gift-receiving relations with friends

Sex	n	Total	Mean	Median	Max	Mode	SD
Female	168	492	2.9	2	16	0	2.6
Male	168	213	1.3	0	11	0	2.1
Both	**336**	**705**	**2.1**	**1**	**-**	**0**	**2.5**

Women had more gift-giving relations with female friends than with male friends ($Z = 10.05$, $p < 0.0001$), and men had more gift-giving relations with male friends ($Z = 4.32$, $p < 0.0001$).

We counted the instances where one sex either had more gift-giving relations with the same or the opposite sex, for example whether a female student gave to more female friends than to male friends. Women gave to more female friends than male friends in 123 instances - in 7 instances more to their male friends; men gave to more male friends than female friends in 57 instances - in 22 instances to more female friends. A Chi-Square cross tabulation showed that the four groups of instances were independent ($\chi^2 = 115.54$, $df = 1$ $p <$

0.0001).

This also held true when we checked for only those students that gave to *both* sexes (χ^2 = 13.21, df = 1, p = 0.00028).

Gift-giving relations with friends correlated with gift-giving relations with the rest, both for women (F = 62.0, df = 166, p < 0.0001, R^2 = 0.27) and men (F = 56.9, df = 166, p < 0.0001, R^2 = 0.26).

Women gave 88 gifts by themselves to the family of their partner and men gave 38. On average, women gave 0.9 (SD = 0.8) and men 0.6 (SD = 0.6), with women giving more than men (F = 8.00, df = 158, p = 0.005). Gifts given in general did not interact with sex (p = 0.86).

4.4.2 Gift-receiving relations

Women had a mean of 10.1 (SD = 3.93) and a mode of 9; and men a mean of 7.5 (SD = 2.97) and a mode of 7 gift-receiving relations. Women received gifts from more persons than men (t = 6.76, df = 334, p < 0.0001).

Looking at genetic family only, women had a mean of 6.5 (SD = 2.5) and men 5.8 (SD = 2.0) gift-receiving relations; women receiving from more family members than men (t = 2.92, df = 334, p = 0.0038).

Looking at friends only, women had a mean of 2.9 (SD = 2.6) and men 1.3 (SD = 2.1) gift-receiving relations (table 4.8), showing women receiving from more friends than men (Z = 6.98, p < 0.0001). Women had more gift-receiving relations with female friends (Z = 10.33, p < 0.0001) and men had more gift-receiving relations with male friends (Z = 4.5221, p < 0.0001).

We counted the instances where one sex either had more gift-receiving relations with the same or the opposite sex, for example whether a female student received from more female friends than from male friends. Women received from more female friends than male friends in 126 instances - in 5 instances from more male friends; men received from more male friends than female friends in 55 instances - in 18 instances from more female friends. A Chi-Square cross tabulation showed that the four groups of instances were independent (χ^2 = 115.541, df = 1 p < 0.0001).

4.4.3 Christmas gifts given

On average, women gave 13.3 (SD = 5.8; modal number 12) gifts, while men gave 8.1 (SD = 4.3; modal number 8). Women gave more Christmas gifts than men did (t = 9.86, df = 334, p < 0.0001, square root-transformed data).

Looking at genetic family, on average women gave 6.4 (SD = 3.4) and men 4.7 (SD = 2.7) Christmas gifts, with women giving more than men did ($t = 5.39$, $df = 334$ and $p < 0.0001$, square root-transformed data).

Women gave a mean of 3.7 (SD = 3.4; mode 0) and men 1.4 (SD = 1.9; mode 0) gifts to friends. Women gave more Christmas gifts to friends than men did ($Z = 7.43$, $p < 0.0001$).

Women gave a mean of 3.3 (SD = 2.9) gifts to female friends and 0.4 (SD = 1.1) gifts to male friends, giving more gifts to female friends than to male friends ($Z = 10.2301$, $p < 0.0001$).

Men gave a mean of 1.0 (SD = 1.4) to male friends and 0.4 (SD = 0.8) to female friends: more gifts to male friends than to female friends ($Z = 4.63$, $p < 0.0001$).

4.4.4 Christmas gifts received

On average, women received 12.5 (SD = 5.9; modal number 9) gifts and men 8.9 (SD = 3.8; modal number 7) gifts. Women received more Christmas gifts than men did ($t = 6.70$, $df = 334$, $p < 0.0001$, square root-transformed data),

Looking at genetic family, on average women received 8.5 (SD = 4.2) and men 6.9 (SD = 3.1) Christmas gifts, with women receiving more than men ($t = 3.61$, $df = 334$ and $p = 0.0003$, square root-transformed data).

Women received a mean of 2.9 (SD = 2.6; mode 0) and men 1.3 (SD = 2.1; mode 0) gifts from friends. Women received more Christmas gifts from friends than men did ($Z = 6.98$, $p < 0.0001$).

Women received a mean of 2.6 (SD = 2.3) gifts from female friends, and a mean of 0.3 (SD = 0.7) gifts from male friends, receiving more gifts from female friends than from male friends ($Z = 10.33$, $p < 0.0001$). Men received a mean of 0.9 (SD = 1.3) gifts from male friends and a mean of 0.4 (SD = 1.1) gifts from female friends, receiving more from male friends than from female friends ($Z = 4.52$, $p < 0.0001$).

4.4.5 Money spent on Christmas gifts in total

We removed two outliers from the female students (NOK 12,700 and NOK 9,725) and one from the male students (NOK 551,666). The male student's extravagant outlier came from a NOK 550,000 gift to a male friend, reported as "A new apartment".

In total, women spent minimum NOK 240, maximum NOK 6797, mean NOK 1870 (SD = 1028.4) on gifts and men minimum NOK 115, maximum NOK 4883, mean NOK 1396 (SD = 837), with women spending more than men ($t = 5.08$, $df = 331$, $p < 0.0001$, log-transformed data).

After removing two outliers from the female students (NOK 7225 and NOK 6597) and one from the male students (NOK 75), on average women spent NOK 986 (SD = 549) and men NOK 896 (SD = 523) on genetic family, with women spending more than men did ($t = 1.98$ $df = 331$, $p = 0.0482$, log-transformed data).

After removing one outlier from the male students (NOK 550,250), on average women spent NOK 339 (SD = 337) and men NOK 160 (SD = 245) on friends, with women spending more money on friends than men did ($Z = 6.44$, $p < 0.0001$).

Grouped into the sexes, women spent a mean of NOK 296 (SD = 292) on female friends and NOK 43 (SD = 109) on male friends; and men spent a mean of NOK 56 (SD = 126) on female friends and NOK 106 (SD =172) on male friends. Women spent more money on Christmas gifts to female friends than to male friends ($Z = 10.04$, $p < 0.0001$) and men spent more money on Christmas gifts to male friends than to female friends ($Z = 3.70$, $p = 0.0002$).

4.4.6 Average spending on Christmas gifts per receiver

After removing outliers NOK 1075 and NOK 1081 from the females and NOK 45,972, NOK 19 and NOK 18 from the males, on average women spent NOK 148 (SD = 101) per receiver, with a maximum NOK 680 and a minimum of NOK 32; and on average men spent NOK 160 (SD = 84) per receiver, with a maximum NOK 550 and a minimum of NOK 29. There was a near-significance for men spending more than women on Christmas gifts per receiver ($t = -1.91$, $df = 329$, $p = 0.057$, log-transformed data).

On average, women spent NOK 169 (SD = 143) and men NOK 174 (SD = 112) per family member, neither spending significantly more than the other ($t = 1.03$, $df = 334$, $p = 0.31$, log-transformed data).

Analyzing friends, we removed outlier NOK 183,417 from the male sample. On average, women spent NOK 91 (SD = 75) and men NOK 66 (SD = 86). When the non-giving students were removed from the sample, women spent NOK 115 (SD = 66) and men NOK 126 (SD = 81) per friend. Neither sex spent significantly more than the other per friend ($t = -0.83$, $df = 214$, $p = 0.41$, square root-transformed data).

After dividing the students into two groups, one with *male* gift-givers and *male* gift-receivers (mean NOK 110, SD = 58), and the other with *female* gift-givers and *female* gift-receivers (mean NOK 115, SD = 65), on average there was no difference between women spending per female friend than men spending per male friend ($t = 0.48$, $df = 168$, $p = 0.63$).

We then divided the students into two groups, one with *male* gift-givers and *female* gift-receivers (mean NOK 28, SD = 75), and the other with *female* gift-givers and *male* gift-receivers (mean NOK 32, SD = 66), there was no difference between men spending per female friend than women spending per male friend on average ($Z = 1.26$, $p = 0.21$).

Women spent on average NOK 272 (SD = 102), men NOK 192 (SD =63) on their children. This difference was not statistically significant (Z = 1.11, p = 0.27).

Women spent on average NOK 750 (SD = 102), men NOK 711 (SD =63) on their partners. This difference was not significant (Z = 1.11, p = 0.48).

4.4.7 Average spending per Christmas gift

We removed outliers NOK 60,182, NOK 29 and NOK 26 from the males, and NOK 1,768 and NOK 1,274 from the females. On average, women spent NOK 156 (SD = 110) and men NOK 193 (SD = 101) per gift, with men spending more than women (F = 10.16, df = 329, p = 0.002, log-transformed data).

Removing outlier NOK 21 from males and NOK 1,289 from women, on average women spent NOK 168 (SD = 121) and men NOK 211 (SD = 123) per gift to family members, with men spending more than women (F = 10.53, df = 332, p = 0.001, log-transformed data).

Analyzing friends, we removed outliers NOK 220,100 from men and NOK 1800 from women. On average, women spent NOK 91 (SD = 67) and men 69 NOK (SD = 93) per gift to friends. When the non-giving students were removed from the sample, on average women spent NOK 101 (SD = 59) and men NOK 133 (SD = 90) per gift to friends, with men spending more than women (F = 10.55, df = 214, p = 0.001, square root-transformed data).

After dividing the students into two groups, one with *male* gift-givers and *male* gift-receivers (mean NOK 114, SD = 54), and the other with *female* gift-givers and *female* gift-receivers (mean NOK 98, SD = 57), on average men spent more on male friends than women spent on female friends per gift (t = 2.12, df = 166, p = 0.036).

We then divided the students into two groups, one with *male* gift-givers and fe*male* gift-receivers (mean NOK 37, SD = 71), and the other with *female* gift-givers and *male* gift-receivers (mean NOK 27, SD = 70), on average there was no difference between men spending per gifts to female friend than women spending on gifts per male friend (Z = 1.41, p = 0.16).

4.4.8 Emotional relations with mother and father

On average, the relation with mother was for women 7.07 (SD = 1.58) and for men 7.21 (SD = 1.51). No significant difference was found between the sexes (t = 0.84, df = 333, p = 0.40).

On average, the relation with father was for women 6.84 (SD = 1.99) and men 6.69 (SD =

1.81). No significant difference was found between the sexes ($t = 0.71$, $df = 331$, $p = 0.48$).

Women did not prefer any of the parents ($t = 1.46$, $df = 165$, $p = 0.14$), but men preferred mother ($t = 3.78$, $df = 166$, $p = 0.0002$).

Women's emotional relation with mother correlated with their relation with father ($F = 23.06$, $df = 163$, $p < 0.0001$, $R^2 = 0.12$), and this was also true for men ($F = 45.00$, $df = 165$, $p < 0.0001$, $R^2 = 0.21$).

Comparing the average emotional relation with mother and father between men (6.95) and women (6.96), showed no difference ($t = 0.09$, $df = 331$, $p = 0.93$).

4.4.9 Sibling closest to heart

The students that had two siblings were asked which sibling was closest to heart. In our sample these were 72 students, 40 women and 32 men.

A proportions test (Pearson) showed that women preferred men (21 out of 40) to women (19 out of 40), but obviously not significantly ($\chi^2 = 0.02$, $df = 1$, $p = 0.87$).

A proportions test (Pearson) showed that men preferred men (19 out of 32) to women (13 out of 32), but not significantly ($\chi^2 = 1.53$, $df = 1$, $p = 0.21$).

For all students, there was no preference for either sex ($\chi^2 = 0.68$, $df = 1$, $p = 0.41$).

4.4.10 Like or dislike buying or making Christmas gifts

Women reported a mean score of 6.48 (SD = 1.95) and men 4.66 (SD = 2.05), a significant difference ($t = 8.336$, $df = 333$ and $p < 0.0001$).

Enjoyment in buying or making Christmas gifts correlated with the total number of gifts given by women ($F = 12.49$, $df = 163$, $p = 0.0005$, $R^2 = 0.07$) and by men ($F = 24.29$, $df = 166$, $p < 0.0001$, $R^2 = 0.13$).

Enjoyment in buying or making Christmas gifts correlated with the total number of gifts given to genetic family by women ($F = 4.99$, $df = 163$, $p = 0.03$, $R^2 = 0.029$) and by men ($F = 16.11$, $df = 166$, $p < 0.0001$, $R^2 = 0.09$).

Enjoyment in buying or making Christmas gifts correlated with the total number of gifts given to friends by women ($F = 4.85$, $df = 163$, $p = 0.03$, $R^2 = 0.026$) and by men ($F = 9.93$, $df = 166$, $p = 0.002$, $R^2 = 0.06$).

4.4.11 Self-made Christmas gifts given

A higher proportion of women (60 of 168) than men (22 of 168) gave at least one self-made Christmas gift ($\chi^2 = 21.8$, df = 1, $p < 0.0001$).

4.4.12 Christmas gifts procured single-handedly

A higher proportion of men (34 of 168) than women (19 of 168) procured all Christmas gifts by themselves ($\chi^2 = 4.10$, df = 1, $p = 0.04$).

4.4.13 Reciprocity in gift-giving/gift-receiving relations

Gift-giving relations correlated with gift-receiving relations for women ($F = 675$, df = 166, $p < 0.00001$, $R^2 = 0.80$) and for men ($F = 371.1$, df = 166, $p < 0.00001$, $R^2 = 0.69$).

Gift-giving relations with genetic family correlated with gift-receiving relations with genetic family for women ($F = 210$, df = 166, $p < 0.00001$, $R^2 = 0.56$) and for men ($F = 176$, df = 166, $p < 0.00001$, $R^2 = 0.52$).

Gift-giving relations with friends correlated with gift-receiving relations with friends for women ($F = 3009$, df = 166, $p < 0.00001$, $R^2 = 0.95$) and for men ($F = 1567$, df = 166, $p < 0.00001$, $R^2 = 0.90$).

4.5 Birth order

We tested the effects of birth order on gift-giving and gift-receiving relations, gifts given and gifts received, money spent per receiver, value of Christmas gifts given and money spent in total on receiver category, and also the value of Christmas gifts received; the emotional relations with close family and person closest to heart, enjoyment in buying or making Christmas gifts, self-made gifts, self-procured gifts and finally the reciprocity in giving and receiving. In the following sections all the tests are controlled for by age. Sibship size is controlled for when ever the students give or receive from near-family members. Only the significant interactions are reported.

4.5.1 Gift-giving relations

Firstborns had 11.9 (SD = 6.5), middleborns 12.7 (SD = 5.2) and lastborns 11.6 (SD = 5.4) gift-giving relations. There were neither linear ($F = 0.91$, df =333, $p = 0.41$, square root-transformed data) nor quadratic ($F = 1.80$, df = 334, $p = 0.18$, square root-transformed data) birth-order effects. When we used the linear trend of firstborns (mean 11.9, SD = 6.7, n = 160), age-gap laterborns (mean 14.6, SD = 5.9, n = 28) and laterborns (mean 11.5, SD = 5.1, n = 148) we found a difference between age-gap laterborns and laterborns ($F = 3.24$, df =333, $p = 0.04$, square root-transformed data), showing age-gap laterborns having more gift-giving relations than laterborns.

Firstborns had 6.0 (SD = 2.7), middleborns 7.0 (SD = 2.3) and lastborns 6.1 (SD = 2.6) gift-giving relations with their genetic family. There were both linear ($F = 3.66$, df = 333, $p = 0.03$, square root-transformed data) and quadratic birth-order effects ($F = 7.17$, df = 334, $p = 0.008$, square root-transformed data). From the linear birth-order effects there were only significant differences between firstborns and middleborns (Scheffé 0.95 confidence intervals), showing middleborns having more gift-giving relations.

When removing siblings from the recipients of genetic family, firstborns had 4.8 (SD = 2.7), middleborns 4.5 (SD = 2.2) and lastborns 4.7 (SD = 2.3) gift-giving relations with their genetic family. There were neither linear ($F = 0.19$, df = 333, $p = 0.83$, square root-transformed data) and quadratic birth-order effects ($F = 0.14$, df = 334, $p = 0.71$, square root-transformed data).

Firstborns had 2.5 (SD =2.0), middleborns 2.4 (SD = 1.9) and lastborns 2.5 (SD = 1.9) gift-giving relations with half-near family. There were no linear (Kruskal-Wallis $\chi^2 = 0.20$, df = 2, $p = 0.90$), nor quadratic (Kruskal-Wallis $\chi^2 = 0.04$, df = 1, $p = 0.84$) birth-order effects on gift-giving relations with half-near family.

Firstborns had 2.5 (SD =2.9), middleborns 2.5 (SD = 2.8) and lastborns 2.1 (SD = 2.3) gift-giving relations with friends. There were no linear (Kruskal-Wallis $\chi^2 = 0.60$, df = 2, p =

0.74), or quadratic (Kruskal-Wallis $\chi^2 = 0.04$, df = 1, p = 0.84) birth-order effects on gift-giving relations with friends. However, there were significant (Kruskal-Wallis $\chi^2 = 6.63$, df = 1, p = 0.01) sex-pattern birth-order effects on lastborns with older sibling of same sex (mean 1.5, SD = 2.1, n = 54) against firstborns with younger sibling of opposite sex (mean 3.1, SD = 3.6, n = 54), also there were significant (Kruskal-Wallis $\chi^2 = 5.97$, df = 1, p = 0.015) effects of lastborns with older sibling of same sex against only children (mean 2.9, SD = 3.0, n = 37). Lastborns had least gift-receiving relations in both cases.

Grouping students by same sex of gift-giver and gift-receiver, for women students, firstborns had 3.1 (SD =2.4), middleborns 3.2 (SD = 2.9) and lastborns 2.3 (SD = 2.2) gift-giving relations with female friends. There were no linear (Kruskal-Wallis $\chi^2 = 3.87$, df = 2, p = 0.15) or quadratic (Kruskal-Wallis $\chi^2 = 0.35$, df = 1, p = 0.55) birth-order effects. However, grouping firstborns and middleborns against lastborns showed lastborns having fewer gift-giving relations than the others (Kruskal-Wallis $\chi^2 = 3.86$, df = 1, p = 0.05).

For male students, firstborns had 1.0 (SD =1.5), middleborns 1.0 (SD = 1.6) and lastborns 1.0 (SD = 1.3) gift-giving relations with male friends. There were no linear (Kruskal-Wallis $\chi^2 = 1.51$, df = 2, p = 0.68) or quadratic (Kruskal-Wallis $\chi^2 = 1.17$, df = 1, p = 0.56) birth-order effects. No other grouping showed any effects.

4.5.2 Gift-receiving relations

Firstborns had 9.2 (SD = 3.8), middleborns 9.6 (SD = 4.3) and lastborns 7.8 (SD = 5.4) gift-receiving relations. There were linear (F = 6.09, df =333, p = 0.002, square root-transformed data), but not quadratic (F = 2.52, df = 334, p = 0.11, square root-transformed data) birth-order effects. From the linear birth-order effects there were significant differences between lastborns and firstborns, and lastborns and middleborns (Scheffé 0.95 confidence intervals), showing lastborns having fewer gift-receiving relations than the others.

Firstborns had 6.4 (SD = 2.3), middleborns 6.7 (SD = 2.5) and lastborns 5.5 (SD = 2.1) gift-receiving relations with their genetic family. There were both linear (F = 8.24, df = 333, p = 0.0003) and quadratic birth-order effects (F = 4.69, df = 334, p = 0.03). From the linear birth-order effects there were significant differences between lastborns and firstborns, and between lastborns and middleborns (Scheffé 0.95 confidence intervals), showing lastborns having fewer gift-receiving relations than the others.

When removing siblings from genetic family, firstborns had 5.2 (SD = 2.2), middleborns 4.4 (SD = 2.3) and lastborns 4.1 (SD = 1.8) gift-receiving relations with their genetic family. There were linear (F = 10.33, df = 333, p = 0.00004) birth-order effects, but no quadratic birth-order effects (F = 0.53, df = 334, p = 0.47). From the linear birth-order effects there were significant differences between firstborns and middleborns, and between firstborns and lastborns (Scheffé 0.95 confidence intervals), showing firstborns having more gift-receiving relations than the others.

Firstborns had 3.3 (SD =2.0), middleborns 2.5 (SD = 2.2) and lastborns 2.2 (SD = 1.7) gift-receiving relations with half-near family. There were linear (Kruskal-Wallis $\chi^2 = 24.85$, df = 2, $p < 0.00005$), birth-order effects, showing firstborns having more gift-receiving relations than the others, but no quadratic (Kruskal-Wallis $\chi^2 = 2.03$, df = 1, p = 0.15) birth-order effects on gift-receiving relations with half-near family.

Firstborns had 2.3 (SD =2.7), middleborns 2.3 (SD = 2.8) and lastborns 1.8 (SD = 2.1) gift-receiving relations with friends. There were no linear (Kruskal-Wallis $\chi^2 = 1.60$, df = 2, p = 0.45) or quadratic (Kruskal-Wallis $\chi^2 = 0.004$, df = 1, p = 0.94) birth-order effects on gifts given to friends. However, there were significant (Kruskal-Wallis $\chi^2 = 8.39$, df = 1, p = 0.004) sex-pattern birth-order effects on lastborns with older sibling of same sex (mean 1.3, SD = 1.9, n = 54) against firstborns with younger sibling of opposite sex (mean 2.7, SD = 3.1, n = 54); also there were significant (Kruskal-Wallis $\chi^2 = 6.03$, df = 1, p = 0.01) effects of lastborns with older sibling of same sex against only children (mean 2.8, SD = 2.9, n = 37) . Lastborns had least gift-receiving relations in both cases.

Grouping students by same sex of gift-giver and gift-receiver, for women students, firstborns had 2.9 (SD =2.2), middleborns 3.1 (SD = 2.8) and lastborns 2.1 (SD = 2.1) gift-receiving relations with female friends. There were no linear (Kruskal-Wallis $\chi^2 = 5.24$, df = 2, p = 0.073) or quadratic (Kruskal-Wallis $\chi^2 = 0.58$, df = 1, p = 0.45) birth-order effects. However, grouping firstborns and middleborns against lastborns showed lastborns having fewer gift-receiving relations than the others (Kruskal-Wallis $\chi^2 = 5.24$, df = 1, p = 0.022).

For male students, firstborns had 0.8 (SD =1.4), middleborns 0.8 (SD = 1.4) and lastborns 0.9 (SD = 1.1) gift-receiving relations with male friends. There were no linear (Kruskal-Wallis $\chi^2 = 1.09$, df = 2, p = 0.58) or quadratic (Kruskal-Wallis $\chi^2 = 0.93$, df = 1, p = 0.34) birth-order effects. No other grouping showed any effect.

4.5.3 Number of Christmas gifts given

On average, firstborns gave 10.4 (SD = 5.6), middleborns 11.2 (SD = 5.0) and lastborns 10.9 (SD = 6.2) Christmas gifts. There were neither linear (F = 0.55, df =334, p = 0.46, log-transformed data) nor quadratic (F = 1.05, df = 335, p = 0.31, log-transformed data) birth-order effects on number of Christmas gifts given. When we used the linear trend of firstborns (mean 10.4, SD = 5.6, n = 160), age-gap laterborns (mean 14.7, SD = 6.4, n = 28) and laterborns (mean 10.2, SD = 5.4, n = 148) we found a difference between age-gap laterborns and laterborns; and between age-gap laterborns and firstborns (F = 7.15, df =334, p = 0.0009, log-transformed data), showing age-gap laterborns giving more than both firstborns and laterborns.

Firstborns gave 5.5 (SD = 3.2), middleborns 5.9 (SD = 2.7) and lastborns 5.7 (SD = 3.2) Christmas gifts to genetic family. There were neither linear (F = 0.38, df = 334, p = 0.54,

log-transformed data) nor quadratic birth-order effects (F = 1.07, df = 335, p = 0.30, log-transformed data) on Christmas gifts given to genetic family. Firstborns (mean 5.5, SD = 3.2, n = 160), age-gap laterborns (mean 7.7, SD = 3.5, n = 28) and laterborns (mean 5.4, SD = 2.9, n = 148) had a difference between age-gap laterborns and firstborns (F = 6.34, df =334, p = 0.0019, log-transformed data); and between age-gap laterborns and laterborns (F = 6.55, df =334, p = 0.0016, log-transformed data).

Removing siblings from genetic family, firstborns gave 4.1 (SD = 2.9), middleborns 3.5 (SD = 2.7) and lastborns 4.0 (SD = 2.5) Christmas gifts to genetic family. There were neither linear (F = 1.58, df =333, p = 0.21, log-transformed data) nor quadratic (F = 2.08, df = 334, p = 0.15, log-transformed data) birth-order effects on number of Christmas gifts given. However, there were age-gap birth order differences (F = 3.42, df =330, p = 0.005, log-transformed data) between only-borns (mean 5.4, SD = 2.9, n = 39) and middleborns (3.5, SD = 2.7, n = 57), with only-borns giving more than middleborns.

Firstborns gave 1.9 (SD = 1.2), middleborns 1.6 (SD = 1.1) and lastborns 1.8 (SD = 1.4) Christmas gifts to their parents. There were neither linear (F = 0.74, df = 334, p = 0.39, log-transformed data) nor quadratic (F = 2.35, df = 335, p = 0.13, log-transformed data) birth-order effects on Christmas gifts given to parents. There were age-gap birth-order effects (F = 3.37, df = 334, p = 0.036, log-transformed data), but when checking for differences in pairwise comparisons (Scheffé 0.95 confidence intervals), they disappeared.

Firstborns gave 1.6 (SD =1.1), middleborns 2.4 (SD = 1.3) and lastborns 1.7 (SD = 1.4) Christmas gifts to their siblings. There were both strong linear (F = 12.81, df =334, p < 0.0001, log-transformed data) and quadratic (F = 22.28, df = 335, p < 0.0001, log-transformed data) birth-order effects on number of Christmas present given to siblings. Pairwise comparisons (Scheffé 0.95 confidence intervals) showed differences between firstborn and middleborn and between laterborn and middleborn from the linear birth-order effects. Middleborns gave more than the others.

Firstborns gave 2.7 (SD = 3.3), middleborns 1.9 (SD = 2.0) and lastborns 1.8 (SD = 2.1) Christmas gifts to half-near family. There were linear (Kruskal-Wallis $\chi^2 = 8.19$, df = 2, p = 0.02) birth-order effects, but no quadratic (Kruskal-Wallis $\chi^2 = 0.14$, df = 1, p = 0.70) birth-order effects. The linear effects showed firstborns giving more to half-near family than the others.

Firstborns gave 2.6 (SD =3.1), middleborns 2.7 (SD = 3.2) and lastborns 2.3 (SD = 2.8) Christmas gifts to friends. There were no linear (Kruskal-Wallis $\chi^2 = 0.26$, df = 2, p = 0.88) or quadratic (Kruskal-Wallis $\chi^2 = 0.0064$, df = 1, p = 0.94) birth-order effects on gifts given to friends.

Grouping students by same sex of gift-giver and gift-receiver, for women students, firstborns gave 3.5 (SD =2.9), middleborns 3.8 (SD = 3.5) and lastborns 2.7 (SD = 2.6) Christmas gifts to female friends. There were no linear (Kruskal-Wallis $\chi^2 = 2.75$, df = 2, p = 0.25) or quadratic (Kruskal-Wallis $\chi^2 = 0.44$, df = 1, p = 0.51) birth-order effects on gifts

given from women to female friends.

For male students, firstborns gave 0.9 (SD =1.3), middleborns 0.9 (SD = 1.4) and lastborns 1.1 (SD = 1.4) Christmas gifts to male friends. There were no linear (Kruskal-Wallis χ^2 = 1.81, df = 2, p = 0.40) or quadratic (Kruskal-Wallis χ^2 = 0.41, df = 2, p = 0.52) birth-order effects on gifts given from men to male friends.

4.5.4 Number of Christmas gifts received

After removing one outlier of 43.5 gifts from firstborns, firstborns received 10.9 (SD = 5.0), middleborns 11.6 (SD = 5.8) and lastborns 9.7 (SD = 4.1) Christmas gifts on average. There were both linear (F = 5.18, df =332, p = 0.006, log-transformed data) and quadratic (F = 4.05, df = 333, p = 0.045, log-transformed data) birth-order effects on amount of Christmas gifts received. There were significant differences between lastborns and firstborns; and lastborns and middleborns from linear birth-order effects, with lastborns receiving fewer gifts.

Firstborns received 7.9 (SD = 4.0), middleborns 8.4 (SD = 3.8) and lastborns 7.0 (SD = 3.3) Christmas gifts from genetic family. There were linear (F = 3.31, df = 333, p = 0.04, log-transformed data), but only near significant quadratic birth-order effects (F = 3.26, df = 334, p = 0.07, log-transformed data) on Christmas gifts received from genetic family. And when the confidence intervals were checked for linear birth-order effects with Scheffé, there were no group differences.

When siblings were removed from genetic family, firstborns received 7.1 (SD = 3.9), middleborns 6.0 (SD = 3.8) and lastborns 5.8 (SD = 3.0) Christmas gifts from genetic family. There were significant linear (F = 4.19, df = 333, p = 0.02, log-transformed data), but no quadratic (F = 0.47, df = 334, p = 0.49, log-transformed data) birth-order effects on Christmas gifts received from genetic family. Pairwise comparisons (Scheffé 0.95 confidence intervals) showed only difference between firstborns and lastborns from the linear birth-order effects, with firstborns receiving more.

After removing three outliers (13 and 14 from firstborns and 13 from lastborns), firstborns got on average 2.1 (SD = 1.1), middleborns 2.5 (SD = 1.3) and lastborns 2.3 (SD = 1.3) Christmas gifts from their parents. There were near significant linear (F = 2.91, df = 330, p = 0.06, log-transformed data) and no quadratic (F = 2.83, df = 331, p = 0.09, log-transformed data) birth-order effects on Christmas gifts received from parents. However, grouping firstborns against laterborns gave a significant linear effect (F = 5.28, df = 331, p = 0.02, log-transformed data), showing firstborns getting less gifts than the others.

Firstborns got 4.0 (SD = 2.9), middleborns 2.7 (SD = 2.5) and lastborns 2.5 (SD = 2.0) Christmas gifts from half near-family. There were linear (Kruskal-Wallis χ^2 = 23.33, df = 2, p < 0.0001), but only near significant quadratic (Kruskal-Wallis χ^2 = 3.47, df = 1, p = 0.06) birth-order effects. The linear birth-order effects showed firstborns receiving more

Christmas gifts from half-near family than the others.

Firstborns got 1.0 (SD =0.5), middleborns 1.3 (SD = 0.5) and lastborns 1.0 (SD = 0.5) Christmas gifts from their siblings. There were both linear ($F = 12.7$, df =311, $p < 0.001$, log-transformed data) and quadratic ($F = 24.35$, df = 312, $p < 0.001$, log-transformed data) birth-order effects on Christmas gifts received from siblings. Pairwise comparisons (Scheffé 0.95 confidence intervals) showed differences between firstborns and middleborns and between lastborns and middleborns from the linear birth-order effects, with middleborns receiving more than the others.

Firstborns got 2.3 (SD =2.6), middleborns 2.3 (SD = 2.8) and lastborns 1.8 (SD = 2.1) Christmas gifts from friends. There were no linear (Kruskal-Wallis $\chi^2 = 1.60$, df = 2, $p = 0.45$) or quadratic ($Z = 1.16$, $p = 0.95$) birth-order effects on gifts received from friends. However, there were significant ($Z = 2.89$, $p = 0.004$) sex-pattern birth-order effects on firstborns with younger sibling of opposite sex (mean 2.7, SD = 3.1, n = 54) against lastborns with older sibling of same sex (mean 1.3, SD = 1.9, n = 54). And similarly only-children (mean 2.8, SD = 3.0, n = 37) against lastborns with older sibling of same sex gave significant differences on number of gifts received from friends ($Z = 2.45$, $p = 0.01$).

Grouping students by same sex of gift-receiver and gift-giver, for female students, firstborns got 2.9 (SD =2.2), middleborns 3.1 (SD = 2.8) and lastborns 2.1 (SD = 2.1) Christmas gifts from female friends. There were no linear (Kruskal-Wallis $\chi^2 = 5.52$, df = 2, $p = 0.07$) or quadratic ($Z = 0.76$, $p = 0.45$) birth-order effects on gifts given to women from female friends. But there were birth-order effects when firstborns and middleborns were grouped together against lastborns ($Z = 2.29$, $p = 0.02$).

For male students, firstborns got 0.9 (SD =1.4), middleborns 0.8 (SD = 1.4) and lastborns 0.9 (SD = 1.1) Christmas gifts from male friends. There were no linear (Kruskal-Wallis $\chi^2 = 1.09$, df = 2, $p = 0.58$) or quadratic ($Z = 0.96$, $p = 0.34$) birth-order effects on gifts given to men from male friends.

4.5.5 Money spent per receiver

On average, firstborns spent NOK 164 (SD = 114), middleborns NOK 133 (SD = 57) and lastborns NOK 150 (SD = 73) per gift-giving relation, after removing three outliers from lastborns (NOK 45,972, NOK 1,080 and NOK 18) and two from firstborns (NOK 1,075 and NOK 20). There were no linear ($F = 0.49$, df = 329, $p = 0.48$, log-transformed data) or quadratic ($F = 2.72$, df = 329, $p = 0.10$, log-transformed data) birth-order effects on spending per receiver.

On average, firstborns spent NOK 178 (SD = 141), middleborns NOK 140 (SD = 59) and lastborns NOK 163 (SD = 93) on their genetic family. There were no linear ($F = 0.26$, df = 334, $p = 0.61$, log-transformed data) or quadratic ($F = 1.73$, df = 334, $p = 0.19$, log-transformed data) birth-order effects on money spent on genetic family.

Removing siblings from genetic family, firstborns spent on average NOK 169 (SD = 162), middleborns NOK 133 (SD = 93) and lastborns NOK 160 (SD = 146) on their genetic family. There were no linear (F = 0.98, df = 333, p = 0.37, log-transformed data) or quadratic (F = 3.06, df = 334, p = 0.08, log-transformed data) birth-order effects on money spent on genetic family, after removing siblings as recipients.

Firstborns spent on average NOK 394 (SD = 342), middleborns NOK 306 (SD = 174) and lastborns NOK 378 (SD = 250) on their parents, after removing one outlier from firstborns (NOK 5,000). There were no linear (F = 1.29, df = 332, p = 0.28, log-transformed data) or quadratic birth-order effects (F = 2.53, df = 332, p = 0.11, log-transformed data) on money spent on genetic parents.

Firstborns spent on average NOK 202 (SD = 175), middleborns NOK 158 (SD = 95) and lastborns NOK 206 (SD = 160) on their mothers, after removing one outlier from firstborns (NOK 4,000). There were no linear (F = 1.33, df = 332, p = 0.27, log-transformed data) or quadratic birth-order effects (F = 2.17, df = 333, p = 0.14, log-transformed data) on money spent on mother. The only effect was from middleborns (NOK 158, SD = 95, n = 60) against only children (NOK 272, SD = 203, n = 21), which showed a difference (t = 2.62, df = 58.07, p = 0.007).

Firstborns spent on average NOK 182 (SD = 163), middleborns NOK 148 (SD = 114) and lastborns NOK 172 (SD = 124) on their fathers, after removing one outlier from firstborns (NOK 2,800). There were no linear (F = 0.86, df = 332, p = 0.42, log-transformed data) or quadratic birth-order effects (F = 1.72, df = 333, p = 0.19, log-transformed data) on money spent on father.

After removing 22 only children from the firstborns, on average firstborns spent NOK 233 (SD = 174), middleborns NOK 163 (SD =83) and lastborns NOK 214 (SD = 161) per sibling. On average, there was a near significant linear (F = 2.92, df = 311, p = 0.055, square root-transformed data) and a significant quadratic birth-order effect (F = 4.57, df = 311, p = 0.033, square root-transformed data) on money spent per sibling, showing middleborns giving less than firstborns and lastborns as a group. Controlling for the number of siblings removed the quadratic birth-order effect (p = 0.27, type III Sum of Squares).

From 191 students that had one or more sisters, firstborns spent NOK 277 (SD = 225), middleborns NOK 246 (SD =136) and lastborns NOK 248 (SD = 216) on average per sister. On average, there were no linear (Kruskal-Wallis $\chi^2 = 0.55$, df = 2, p = 0.77) or quadratic (Z= 0.59, p = 0.55) birth-order effects on money spent per sister.

Removing one outlier from firstborns (NOK 3000), we got 202 students having one or more brothers. On average, firstborns spent NOK 251 (SD = 183), middleborns NOK 233 (SD =152) and lastborns NOK 277 (SD = 246) per brother. There were no linear (Kruskal-Wallis $\chi^2 = 0.41$, df = 2, p = 0.81) or quadratic (Z= 0.56, p = 0.58) birth-order effects on money spent on average per brother.

Firstborns spent on average NOK 73 (SD = 66), middleborns NOK 75 (SD = 68) and lastborns NOK 75 (SD = 62) on their half-near family, after removing three outliers from firstborns (NOK 750, 500 and 400). There were no linear (Kruskal-Wallis $\chi^2 = 2.75$, df = 2, p = 0.25) or quadratic (Kruskal-Wallis $\chi^2 = 1.00$, df = 1, p = 0.32) birth-order effects on money spent on average per half-near family member.

Firstborns spent on average NOK 120 (SD = 105), middleborns NOK 86 (SD = 86) and lastborns NOK 112 (SD = 92) on their grandparents, after removing four outliers from firstborns (NOK 1,250, NOK 1,100, NOK 800 and NOK 667). We had removed the students that had no grandparents alive from the sample. There were no linear (Kruskal-Wallis $\chi^2 = 4.00$, df = 2, p = 0.14) effects on money spent on grandparents - but there were quadratic birth-order effects (Z = 1.96, p = 0.05), showing middleborns giving less than firstborns and lastborns as a group.

Removing outlier NOK 183,417 from lastborns and NOK 1,800 from firstborns, on average firstborns spent NOK 79 (SD =82), middleborns NOK 61 (SD = 74) and lastborns NOK 86 (SD = 84) on their friends. There were no linear (Kruskal-Wallis $\chi^2 = 4.55$, df = 2, p = 0.10), but significant quadratic (Kruskal-Wallis $\chi^2 = 4.03$, df = 2, p = 0.05) birth-order effects on spending per friends, showing middleborns giving significantly less than the others.

We grouped the students into same sex of gift-giver and gift-receiver. Removing one outlier, NOK 425, from middleborns, on average firstborns spent NOK 98 (SD = 73), middleborns NOK 76 (SD = 75) and lastborns NOK 84 (SD = 76) per female friend. There were no linear (Kruskal-Wallis $\chi^2 = 3.38$, df = 2, p = 0.18) or quadratic (Kruskal-Wallis $\chi^2 = 1.71$, df = 2, p = 0.19) birth-order effects on women's spending per female friend.

Removing one outlier, NOK 550,000 and NOK 450 from lastborns and NOK 475 from firstborns, firstborns spent on average NOK 43 (SD = 65), middleborns NOK 23 (SD = 35) and lastborns NOK 64 (SD = 76) per male friend. There were no linear (Kruskal-Wallis $\chi^2 = 5.41$, df = 2, p = 0.07) or quadratic (Kruskal-Wallis $\chi^2 = 2.97$, df = 2, p = 0.09) birth-order effects on men's spending per male friend.

4.5.6 Value of Christmas gifts given

Removing two outliers from lastborns (NOK 60,182 and NOK 1,768) and one from firstborns (NOK 1,274), on average firstborns gave Christmas present worth NOK 185 (SD = 131), middleborns NOK 155 (SD = 69) and lastborns NOK 166 (SD = 81). There were no linear (F = 0.84, df = 330, p = 0.43, log-transformed data) or quadratic birth-order effects (F = 0.95, df = 331, p = 0.33, log-transformed data) on value per Christmas present given.

On average, firstborns gave Christmas gifts worth NOK 207 (SD = 173), middleborns NOK

177 (SD = 89) and lastborns NOK 180 (SD = 93) to genetic family. There were no linear (F = 0.26, df = 333, p = 0.77, log-transformed data) or quadratic (F = 0.23, df = 334, p = 0.63, log-transformed data) birth-order effects on value per Christmas present to genetic family.

After removing siblings from genetic family, firstborns gave Christmas gifts worth on average NOK 222 (SD = 269), middleborns NOK 199 (SD = 129) and lastborns NOK 210 (SD = 327) to genetic family. There were no linear (F = 0.02, df = 333, p = 0.98, log-transformed data) or quadratic (F = 0.21, df = 334, p = 0.65, log-transformed data) birth-order effects on value per Christmas present to genetic family, after siblings were removed.

After removing outlier NOK 3333 from firstborns, on average firstborns gave Christmas gifts worth NOK 254 (SD = 281), middleborns NOK 251 (SD = 209) and lastborns NOK 254 (SD = 205) to their parents. There were no linear (F = 0.49, df = 332, p = 0.67, log-transformed data) or quadratic (F = 0.01, df = 334, p = 0.84, log-transformed data) birth-order effects on value per Christmas gifts given to parents.

After removing outliers NOK 1,500 from firstborns, firstborns gave Christmas gifts worth on average NOK 120 (SD = 111), middleborns NOK 138 (SD = 164) and lastborns NOK 116 (SD = 104) to their half-near family. There were no linear (Kruskal-Wallis $\chi^2 = 0.0007$, df = 2, p = 0.9996), and no quadratic (Kruskal-Wallis $\chi^2 = 0.22$, df = 1, p = 0.64) birth-order effects.

After removing outliers NOK 2,000 and NOK 2,025 from firstborns and NOK 1500 from middleborns, on average firstborns gave Christmas gifts worth NOK 102 (SD = 104), middleborns NOK 76 (SD = 91) and lastborns NOK 108 (SD = 115) to their grandparents. There were no linear (Kruskal-Wallis $\chi^2 = 3.29$, df = 2, p = 0.19), but near-significant quadratic (Kruskal-Wallis $\chi^2 = 3.24$, df = 2, p = 0.07) birth-order effects on value per Christmas gifts to grandparents.

Removing NOK 8000 from firstborns, on average firstborns gave Christmas gifts worth NOK 240 (SD = 262), middleborns NOK 258 (SD = 218) and lastborns NOK 243 (SD = 204) to their mother. There were no linear (F = 0.57, df = 332, p = 0.57, log-transformed data) or quadratic (F = 0.48, df = 334, p = 0.49, log-transformed data) birth-order effects on value per Christmas gifts to mother.

On average, firstborns gave Christmas gifts worth NOK 254 (SD = 385), middleborns NOK 209 (SD = 185) and lastborns NOK 260 (SD = 307) to their father. There were no linear (F = 0.98, df = 333, p = 0.38, log-transformed data) or quadratic (F = 0.32, df = 334, p = 0.58, log-transformed data) birth-order effects on value per Christmas gifts to father.

After removing two outliers from lastborns (both NOK 1500), on average firstborns gave Christmas gifts worth NOK 209 (SD =157), middleborns NOK 187 (SD = 123) and lastborns NOK 180 (SD = 136) to their siblings. There were no linear (F = 1.39, df =309, p = 0.25, log-transformed data) or quadratic (F = 0.17, df = 30, p = 0.68, log-transformed data) birth-order effects on value per Christmas gifts to siblings.

After removing one outlier from lastborns (NOK 1500), on average firstborns gave Christmas gifts worth NOK 189 (SD =141), middleborns NOK 215 (SD = 142) and lastborns NOK 208 (SD = 157) to their sisters. There were no linear (F = 0.40, df =187, p = 0.67, log-transformed data) or quadratic (F = 0.47, df = 188, p = 0.49, log-transformed data) birth-order effects on value per Christmas present received from sisters.

Removing outlier NOK 3000 from firstborns, on average firstborns gave Christmas present worth NOK 202 (SD =157), middleborns NOK 219 (SD = 149) and lastborns NOK 260 (SD = 206) to their brothers. There were no linear (F = 0.40, df =188, p = 0.67, log-transformed data) or quadratic (F = 0.47, df = 189, p = 0.49, log-transformed data) birth-order effects on value per Christmas present to brothers.

Removing outlier NOK 220,100 from lastborns and NOK 1,800 from firstborns, on average firstborns gave Christmas present worth NOK 77 (SD =86), middleborns NOK 56 (SD = 62) and lastborns NOK 80 (SD = 82) to their friends. There were no linear (Kruskal-Wallis χ^2 = 3.66, df = 2, p = 0.16), but near-significant quadratic (Kruskal-Wallis χ^2 = 3.52, df = 2, p = 0.06) birth-order effects on value per Christmas present to friends. However, there were significant (Kruskal-Wallis χ^2 = 11.36, df = 1, p = 0.0007) sex-pattern birth-order effects on lastborns with older sibling of opposite sex (mean NOK 73, SD = 70, n = 54) against middleborns (mean NOK 58, SD = 65, n = 57) and also significant (Kruskal-Wallis χ^2 = 11.56, df = 1, p = 0.0007) effects against lastborns with older sibling of same sex (mean NOK 56, SD = 73, n = 54), showing lastborn with older sibling of opposite sex giving more than middleborns and lastborn with older sibling of same sex.

We grouped the students into same sex of gift-giver and gift-receiver. Removing two outliers from firstborn (both NOK1800) and one outlier (NOK 700) from lastborns of women, on average firstborns spent NOK 83 (SD = 62), middleborns NOK 67 (SD = 65) and lastborns NOK 72 (SD = 68) per gift to female friends. There were no linear (Kruskal-Wallis χ^2 = 3.08, df = 2, p = 0.21) or quadratic (Kruskal-Wallis χ^2 = 1.31, df = 2, p = 0.25) birth-order effects on women's spending per Christmas present to female friends. No other groupings showed any effects.

Removing one outlier from lastborn (NOK 550,000) of men, on average firstborns spent NOK 52 (SD = 92), middleborns NOK 28 (SD = 40) and lastborns NOK 69 (SD = 91) per gift to male friends. There were near-significant linear (Kruskal-Wallis χ^2 = 4.78, df = 2, p = 0.09), and near-significant quadratic (Kruskal-Wallis χ^2 = 2.97, df = 2, p = 0.09) birth-order effects on men's spending per Christmas present to male friends.

4.5.7 Money spent in total

On average, firstborns spent NOK 1664 (SD = 1073), middleborns NOK 1558 (SD = 695) and lastborns NOK 1627 (SD = 931) in total on Christmas gifts, after removing two outliers from lastborns (NOK 551,667, NOK 9,725) and one from firstborns (NOK 12,700). There were no linear (F = 0.04, df = 330, p = 0.96, log-transformed data) or quadratic (F = 0.08, df = 331, p = 0.77, log-transformed data) birth-order effects on total spending.

On average, firstborns spent NOK 965 (SD = 750), middleborns NOK 912 (SD = 380) and lastborns NOK 912 (SD = 517) on their genetic family. There were no linear (F = 0.38, df = 333, p = 0.68, log-transformed data) or quadratic (F = 0.76, df = 334, p = 0.38, log-transformed data) birth-order effects on money spent on genetic family.

After removing siblings, firstborns spent on average NOK 714 (SD = 703), middleborns NOK 543 (SD = 287) and lastborns NOK 696 (SD = 703) on their genetic family. There were no linear (F = 1.31, df = 333, p = 0.27, log-transformed data) and only near-significant quadratic (F = 2.89, df = 334, p = 0.09, log-transformed data) birth-order effects on money spent on genetic family after siblings had been removed.

Firstborns spent on average NOK 394 (SD = 342), middleborns NOK 306 (SD = 174) and lastborns NOK 378 (SD = 250) on their genetic parents, after removing one outlier from firstborns (NOK 5,000). There were no linear (F = 1.29, df = 332, p = 0.28, log-transformed data) or quadratic birth-order effects (F = 2.53, df = 332, p = 0.11, log-transformed data) on money spent on genetic parents.

Firstborns spent on average NOK 275 (SD = 366), middleborns NOK 217 (SD = 195) and lastborns NOK 243 (SD = 219) on their half-near family. There were no linear (Kruskal-Wallis $\chi^2 = 0.75$, df = 2, p = 0.69) or quadratic (Kruskal-Wallis $\chi^2 = 0.20$, df = 1, p = 0.66) birth-order effects.

Firstborns spent on average NOK 121 (SD = 105), middleborns NOK 86 (SD = 86) and lastborns NOK 112 (SD = 92) on their grandparents, after removing four outliers from firstborns (NOK 1,250, NOK 1,100, NOK 800 and NOK 667). We removed the students that had no grandparents alive from the sample. There were no linear (Kruskal-Wallis $\chi^2 = 4.00$, df = 2, p = 0.14) effects on money spent on grandparents - but there were quadratic birth-order effects (Z = 1.96, p = 0.05), showing middleborns giving less than firstborns and lastborns as a group.

After removing 22 only children from the firstborns, on average firstborns spent NOK 303 (SD = 200), middleborns NOK 390 (SD =229) and lastborns NOK 292 (SD = 233) on siblings. There were both linear (F = 4.22, df = 311, p = 0.02, square root-transformed data) and quadratic (F = 7.80, df = 311, p = 0.006, square root-transformed data) birth-order effects on money spent on average on siblings. The quadratic effects showed middleborns giving less than firstborns and lastborns. The linear birth-order effects were only significant when comparing lastborns and middleborns (Scheffé 0.95 confidence intervals).

Removing outlier NOK 550,250 from lastborns, on average firstborns spent NOK 199 (SD = 251), middleborns NOK 218 (SD = 238) and lastborns NOK 271 (SD = 309) on Christmas gifts to friends. There were no linear (Kruskal-Wallis $\chi^2 = 1.06$, df = 2, p = 0.59) or quadratic (Kruskal-Wallis $\chi^2 = 0.99$, df = 1, p = 0.32) birth-order effects on money spent on gifts given to friends. However, there were significant (Kruskal-Wallis $\chi^2 = 4.24$, df = 1, p = 0.04) sex-pattern birth-order effects on lastborns with older sibling of same sex (mean

NOK 172, SD = 262, n = 54) against firstborns with younger sibling of opposite sex (mean NOK 278, SD = 344, n = 54), and there were significant (Kruskal-Wallis $\chi^2 = 4.10$, df = 1, p = 0.04) effects of lastborns with older sibling of same sex against only children (mean NOK 294, SD = 334, n = 37). Also there were significant (Kruskal-Wallis $\chi^2 = 9.87$, df = 1, p = 0.002) effects of lastborns with older sibling of same sex against lastborns with older sibling of opposite sex (mean NOK 317, SD = 327, n = 62).

Grouping students by same sex of gift-giver and gift-receiver, for women, on average firstborns spent NOK 322 (SD = 300), middleborns NOK 320 (SD = 342) and lastborns NOK 245 (SD = 246) on Christmas gifts to female friends. There were no linear (Kruskal-Wallis $\chi^2 = 2.74$, df = 2, p = 0.25) or quadratic birth-order effects (Kruskal-Wallis $\chi^2 = 0.0007$, df = 1, p = 0.98) on money spent by women on female friends.

For men, on average firstborns spent NOK 95 (SD = 166), middleborns NOK 64 (SD = 113) and lastborns 141 (SD = 199) on Christmas gifts to male friends. There were no linear (Kruskal-Wallis $\chi^2 = 1.81$, df = 2, p = 0.40) or quadratic (Kruskal-Wallis $\chi^2 = 0.41$, df = 1, p = 0.52) birth-order effects on money spent by men on male friends.

4.5.8 Value of Christmas gifts received

On average, firstborns received Christmas present worth NOK 454 (SD = 471), middleborns NOK 359 (SD = 281) and lastborns NOK 413 (SD = 367), after removing three outliers of NOK 0 from two firstborns and one lastborn. There were no linear (F = 0.81, df = 330, p = 0.45, log-transformed data) or quadratic birth-order effects (F = 1.17, df = 331, p = 0.28, log-transformed data) on value per Christmas present received.

On average, firstborns got Christmas gifts worth NOK 577 (SD = 691), middleborns NOK 429 (SD = 384) and lastborns NOK 512 (SD = 474) from genetic family, after removing five outliers (Two NOK 0 from firstborns and two NOK 0 and NOK 17 from lastborns). There were no linear birth-order effects (F = 1.82, df = 328, p = 0.16, log-transformed data), but there were quadratic birth-order effects (F = 3.81, df = 329, p = 0.05, log-transformed data) on value per Christmas present received from genetic family, showing middleborns giving least.

After removing siblings, firstborns got Christmas gifts worth on average NOK 569 (SD = 683), middleborns NOK 516 (SD = 599) and lastborns NOK 500 (SD = 463) from genetic family. There were no linear (F = 0.37, df = 333, p = 0.69, log-transformed data) or quadratic (F = 1.05, df = 334, p = 0.31, log-transformed data) birth-order effects.

On average, firstborns got Christmas gifts worth NOK 1097 (SD = 1282), middleborns NOK 829 (SD = 893) and lastborns NOK 894 (SD = 960) from their parents. There were no linear (F = 0.89, df = 333, p = 0.41, log-transformed data) or quadratic birth-order effects (F = 1.11, df = 334, p = 0.29, log-transformed data) on value per Christmas gifts received from parents.

On average, firstborns got Christmas present worth NOK 816 (SD = 1078), middleborns NOK 664 (SD = 950) and lastborns NOK 664 (SD = 734) from their mother. There were no linear (F = 0.45, df = 333, p = 0.63, log-transformed data) or quadratic birth-order effects (F = 0.71, df = 334, p = 0.40, log-transformed data) on value per Christmas gifts received from mother.

On average, firstborns got Christmas present worth NOK 1376 (SD = 1617), middleborns NOK 1037 (SD = 853) and lastborns NOK 1518 (SD = 2312) from their father. There were no linear (F = 0.17, df = 333, p = 0.85, log-transformed data) or quadratic birth-order effects (F = 0.29, df = 334, p = 0.59, log-transformed data) on value per Christmas gifts received from father.

After removing one outlier from firstborns (NOK 3000), on average firstborns got Christmas gifts worth NOK 190 (SD =172), middleborns NOK 196 (SD = 147) and lastborns NOK 212 (SD = 156) from their siblings. There were no linear (F = 1.37, df =310, p = 0.26, log-transformed data) or quadratic (F = 0.15, df = 311, p = 0.70, log-transformed data) birth-order effects on value per Christmas gifts received from siblings.

After removing one outlier from firstborns (NOK 3000), on average firstborns got Christmas gifts worth NOK 179 (SD =160), middleborns NOK 164 (SD = 121) and lastborns NOK 203 (SD = 150) from their sisters. There were no linear (F = 0.85, df =187, p = 0.43, log-transformed data) or quadratic birth-order effects (F = 0.19, df = 188, p = 0.66, log-transformed data) on value per Christmas present received from sisters.

On average, firstborns got Christmas gifts worth NOK 189 (SD =174), middleborns NOK 201 (SD = 163) and lastborns NOK 210 (SD = 176) from their brothers. There were no linear (F = 0.28, df =200, p = 0.75, log-transformed data) or quadratic birth-order effects (F = 0.01, df = 201, p = 0.91, log-transformed data) on value per Christmas present received from brothers.

After removing two outliers from firstborns (NOK 5250 and 5000), firstborns got Christmas gifts worth NOK 313 (SD =321), middleborns NOK 246 (SD = 352) and lastborns NOK 277 (SD = 372) from half-near family. There were both linear (Kruskal-Wallis $\chi^2 = 8.12$, df = 2, p = 0.02) and quadratic (Kruskal-Wallis $\chi^2 = 4.43$, df = 1, p = 0.04) birth-order effects on value per Christmas present received from half-near family, showing firstborns receiving more than the others; and middleborn receiving less.

4.5.9 Emotional relations with mother and father

The emotional relation with mother were for firstborns 7.21 (SD =1.55), middleborns 6.71 (SD =1.76) and lastborns 7.29 (SD = 1.38). There were both linear (F = 3.41, df = 332, p = 0.034) and quadratic birth-order effects (F = 6.60, df = 333, p = 0.011). The linear birth-order effect was significant between middleborns and lastborns, with middleborns reporting a significantly lower score than lastborns.

The emotional relation with father were for firstborns 7.04 (SD =1.70), middleborns 6.25 (SD =2.2) and lastborns 6.66 (SD = 1.96). There were both linear (F = 3.67, df = 330, p = 0.03) and quadratic birth-order effects (F = 3.86, df = 331, p = 0.05). The linear birth-order effect was significant between middleborns and firstborns, with middleborns reporting a significantly lower score than firstborns.

When re-arranging the birth-order groups from highest to lowest value of relations (lastborns, firstborns, middleborns), there was a linear correlation for relation with mother and birth order (F = 5.22, df = 333, p = 0.02, $R^2 = 0.02$). Similarly, arranging the values of relation with father (firstborns, lastborns, middleborns) also showed a linear correlation (F = 7.24, df = 331, p = 0.02, $R^2 = 0.008$).

Using the mean value of relation with mother and father and arranging birth order after the highest value of emotional relation (firstborn 7.12 (SD = 1.34), lastborn 6.97 (SD = 1.37), middleborn 6.51 (SD =1.71)) gave a linear correlation (F = 7.28, df = 331, p = 0.02, $R^2 = 0.007$), showing firstborn, then lastborn, then middleborn having the stronger emotional relations with its parents.

Firstborns showed no preference for any parent (t = 1.04, df = 158, p = 0.30), neither did middleborns (t = 1.47, df = 59, p = 0.15), but lastborns did (t = 3.60, df = 113, p = 0.0005), preferring mother.

Although there were combinatory differences between sex and birth order (table 4.9), there were no interactions between birth order and sex on relations to either mother (p = 0.15, p = 0.27) or father (p = 0.54, p = 0.84), linear and quadratic effects, respectively.

Table 4.9. Students' score (scale 1-9) on their relations with their parents during their upbringing

Birth Order	Women's relation with mother			Women's relation with father			Men's relation with mother			Men's relation with father		
	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n
Firstborn	7.23	1.58	160	7.21	1.77	80	7.19	1.54	80	6.87	1.61	160
Middleborn	6.80	1.82	60	6.28	2.23	31	6.55	1.70	29	6.20	2.19	60
Lastborn	6.97	1.45	116	6.62	2.09	57	7.58	1.25	59	6.70	1.85	116
Total	**7.07**	**1.58**	**336**	**6.84**	**1.99**	**168**	**7.21**	**1.51**	**168**	**6.72**	**1.80**	**336**

4.5.10 Sibling closest to heart

The students that had two siblings were asked which sibling was closest to heart. In our sample these were 72 students, 26 firstborns, 29 middleborns and 17 lastborns.

A proportions test (Pearson) showed that firstborns preferred middleborns (16 out of 26 times) to lastborns (10 out of 26 times), but that it was not significant ($\chi^2 = 0.96$, df = 1, p = 0.33).

Middleborns preferred lastborns (18 out of 29 times) to firstborns (11 out of 29 times), but it wasn't significant ($\chi^2 = 1.24$, df = 1, p = 0.27).

Lastborns preferred middleborns (12 out of 17 times) to firstborns (5 out of 17 times), but it wasn't significant ($\chi^2 = 2.12$, df = 1, p = 0.15).

When firstborns and middleborns were grouped together they slightly preferred lastborns (28 out of 55 times), and this difference was not at all significant ($\chi^2 = 0.02$, df = 1, p = 0.89).

When lastborns and middleborns were grouped together they did not prefer firstborns (16 out of 46 times), but this difference was only near-significant ($\chi^2 = 3.67$, df = 1, p = 0.055).

When lastborns and firstborns were grouped together they preferred middleborns (28 out of 43 times), but this difference was not significant ($\chi^2 = 3.35$, df = 1, p = 0.067).

4.5.11 Person closest to heart

We asked the students to name who was closest to them and counted the instances when that person was a family member. Firstborns reported this to be a family member 67 out of 160 times, middleborns 19 out of 60 and lastborns 60 out of 116 times A Chi-square test of independence revealed independence for all factors ($\chi^2 = 6.78$, df = 2, p = 0.03), showing lastborns most often naming family member, then firstborns, then middleborns.

When only counting the times a sibling was reported, firstborns reported it 11 out of 160 times, middleborns 3 out of 60 times and lastborns reported it 20 out of 116 times. A Chi-square test of independence revealed independence for all factors ($\chi^2 = 10.05$, df = 2, p = 0.007), showing lastborns most often naming a sibling, then firstborns, then middleborns.

4.5.12 Enjoyment in buying or making Christmas gifts

We found a mean score of 5.4 (SD = 2.4) for firstborns, 5.6 (SD = 2.1) for middleborns, and 5.8 (SD = 2.05) for lastborns; there were no linear (F = 1.17, df = 332 and p = 0.31) or quadratic birth-order effects (F = 0.02, df = 333 and p = 0.89), and there was no correlation (F = 2.35, df = 333, p = 0.13, $R^2 = 0.007$).

Enjoyment in buying or making Christmas gifts correlated with the total amount of gifts given by firstborns (F = 37.05, df = 156, p = 0.0005, $R^2 = 0.07$), by middleborns (F = 12.77,

df = 58, $p < 0.0007$, $R^2 = 0.18$) and by lastborns ($F = 28.3$, df = 113, $p < 0.0001$, $R^2 = 0.20$).

Enjoyment in buying or making Christmas gifts did not correlate with the total amount of gifts given to genetic family by firstborns ($F = 12.88$, df = 156, $p = 0.08$, $R^2 = 0.0004$), but it correlated for middleborns ($F = 6.17$, df = 58, $p = 0.02$, $R^2 = 0.10$) and for lastborns ($F = 20.06$, df = 114, $p < 0.0001$, $R^2 = 0.15$).

Enjoyment in buying or making Christmas gifts correlated with the total amount of gifts given to friends by firstborns ($F = 27.35$, df = 156, $p < 0.00001$, $R^2 = 0.15$), by middleborns ($F = 5.13$, df = 58, $p = 0.03$, $R^2 = 0.08$) and by lastborns ($F = 6.69$, df = 113, $p = 0.01$, $R^2 = 0.06$).

4.5.13 Self-made gifts

We tested for differences in the proportions of students that gave at least one self-made Christmas gift (firstborns 41 of 160, middleborns 13 of 60, lastborns 28 of 116). There were no linear ($\chi^2 = 0.41$, df = 2, $p = 0.81$) or quadratic birth-order effects ($\chi^2 = 0.16$, df = 1, $p = 0.69$).

4.5.14 Self-procured gifts

We tested for differences in the proportions of students that procured all Christmas gifts by themselves (firstborns 28 of 160, middleborns 11 of 60, lastborns 14 of 116). There were no linear ($\chi^2 = 1.85$, df = 2, $p = 0.40$) or quadratic birth-order effects ($\chi^2 = 0.14$, df = 1, $p = 0.71$); and there was no effect when grouping firstborns and middleborns against lastborns ($\chi^2 = 1.01$, df = 1, $p = 0.31$).

4.5.15 Reciprocity in gift-giving/gift-receiving relations

Gift-giving relations correlated with gift-receiving relations for firstborns ($F = 554.7$, df = 158, $p < 0.00001$, $R^2 = 0.78$), for middleborns ($F = 291.7$, df = 58, $p < 0.00001$, $R^2 = 0.83$) and for lastborns ($F = 365.8$, df = 114, $p < 0.00001$, $R^2 = 0.76$).

With genetic family gift-giving relations correlated with gift-receiving relations for firstborns ($F = 169.5$, df = 158, $p < 0.00001$, $R^2 = 0.52$), for middleborns ($F = 72.15$, df = 58, $p < 0.00001$, $R^2 = 0.55$) and for lastborns ($F = 167.6$, df = 114, $p < 0.00001$, $R^2 = 0.60$).

With friends gift-giving relations correlated with gift-receiving relations for firstborns ($F = 2030$, df = 158, $p < 0.00001$, $R^2 = 0.93$), for middleborns ($F = 1687$, df = 58, $p < 0.00001$, $R^2 = 0.97$) and for lastborns ($F = 1810$, df = 114, $p < 0.00001$, $R^2 = 0.94$).

5 Discussion

A year prior to this study, in Christmas of 1997, Iver Mysterud, Thomas Drevon and Tore Slagsvold, conducted a similar, interview-based survey of fifty graduate students at the Department of Biology, also at the University of Oslo, Norway (Mysterud et. al., 2006). Comparison of the basic properties between our two studies is shown in table AT5. Our study mainly differ from that of Mysterud et al. in that we have a considerably larger sample (our 336 to their 50), our mean age is lower (our 22.9 to their 26.0) and their students were all graduate students from the Department of Biology; we had a broader scope of student affiliations (table AT1).

Essock-Vitale and McGuire (1980) reviewed the anthropological exchange literature in light of the theories of inclusive fitness and reciprocal altruism, and found five predictions that were supported in most of the studies (list of four relevant predictions from Mysterud et al., 2006):

1. Kin will be given more unreciprocated help than non-kin, with close kin receiving the most unreciprocated help.
2. Kin will be given more help than non-kin, with close kin receiving the most help.
3. Friendships will be reciprocal.
4. Large gifts and long-term loans are most likely to come from kin.

Although these predictions were supported in the studies Essock-Vitale and McGuire (1980) reviewed, they mostly reported qualitative data. Mysterud et al. wanted to see if they also would be supported by quantitative data, and that is one of the goals of this study as well.

And similarly, they made three predictions from effects of sex differences (Mysterud et al., 2006):

5. If a woman moved with her husband to his kin after marriage, she would have to cope with a new society after pair-bonding (Geary, 1998), then a more active network-building behavior (like gift-giving behavior) than for men could have been selected for.
6. Women are the most investing sex in their offspring and are also more in need of support and resources during periods of pregnancy and breast feeding. Behaviors eliciting reciprocity among women, the kin of the husband and support from her own family would have been selected for and could show up as differences in gift giving between the sexes.
7. Since female-female coalitions are relatively weak (Rodseth, Smuts et al., 1991; Rodseth, Wrangham et al., 1991), women would need a larger support network than men, and if women use gifts to maintain this network, we should see a difference between the sexes in gift giving.

Mysterud et al. (2006) proposed two predictions from birth-order effects:

8. Since firstborns are reported to identify more closely with their parents and authority (Sulloway, 1996), they will invest more in their close relatives than laterborns.
9. Since middleborns have been reported to be less likely to have a close relationship with their parents (Kennedy, 1989), they will invest less in their relatives than lastborns and firstborns.

Mysterud et al. (2006) made no direct predictions for civil status. We had no direct predictions either, but suspected that the more intense the romantic commitment, the more will investments be channeled to partner at the expense of family and friends. This is quite a strange expectation in our modern society where one should expect that people (even students) have enough resources to be able to give the same amount of gifts to their family regardless of having a romantic partner or not. If we do find differences, this is quite indicative to the involvement of other factors than pure materialistic ones, supportive of evolved mental mechanisms guiding courtship emotions that motivate investment rather than economic rationality.

In this discussion section, we interpret the findings in the results section to resolve the accuracy of the predictions above. The section is divided into five chapters reflecting the chapter structure of the results section with a concluding chapter at the end. The five chapters of the results section we summarize and discuss are: General findings, Kin, partners and friends; Civil status; Sex differences; and Birth order. In the conclusions chapter, we follow the direction of Mysterud et al. and see whether 1) our results support the predictions, and 2) whether they agree with Mysterud et al.'s findings.

5.1 General

The students gave to an average of 11.9 and received from 8.8 persons. When the gift giving was with the same categories of persons as the gift receiving, they gave to an average of 8.1 persons. This is within the norm of other student-based findings (Mysterud et. al., 2006), and of those studies with a broader demographic scope than ours (Borch, 1994; Dunbar and Spoors, 1995; Milardo, 1988; Otnes, Lowrey and Kim, 1993). The students gave on average 13.0 and received 11.6 gifts, and after adjusting givers to receivers, they gave an average of 9.3 gifts, also in accordance with other findings (Borch, 1994; Caplow, 1982; Caron and Ward, 1975).

On average, the students spent NOK 1,689 ($222) on Christmas gifts - about 1.9% of the average NOK 87,567 income from loan, grants and salaries, and money spent on gifts correlated with income. If the students had a regular monthly income, the amount spent can

be calculated to be 23% of the December income. The same expense would have been 8% for the average Norwegian. In contrast to birthday-gift giving, which is spread out across the year, expenses on Christmas gifts are concentrated in time and as we see constitute a substantial portion of the students' income. This difference in percentage spending between students and the average citizen might reflect a desire on the students' part to keep up with the economic standard of gifts given reflected in the society as a whole. There was a slight trend in students giving less than what they received; and giving to fewer people than whom they received from; this being quite natural considering the differences in income and age of the students compared to most of their gift givers.

Age of students had no effect on their spending, but it had an effect on the value of gifts received, with older students getting more expensive gifts.

The more the students enjoyed procuring gifts, the more gifts they gave and the more money they tended to spend on gifts. This was true in general for all receivers as well as friends and family. The correlations were approximately twice as weak for family and friends as when giving to all persons. The students seemed to be more dutiful to their families and friends not needing to enjoy procuring gifts as much to give as they did when giving to persons in general. Age did not affect whether the student enjoyed procuring gifts or not.

The students reported on average better emotional relation with their mother during their upbringing than with their father, although on a scale from 1 to 9, the real difference, though significant, was only a third of a point (0.37). The reported mean was generally quite high for both mother (7.14) and father (6.77), and they correlated with each other. The minor difference between the parents might be attributed to a closer bond with mother in general as mothers traditionally spend more time with their children, especially during the first years of childhood, and perhaps due to the results of enduring stereotypical images of men's main role as being providers. Although it can be argued that more frequent contact with a parent does contribute to a more emotional stable relation with it, also the content and quality of this contact has to be considered. From an evolutionary perspective we expect there to be differences in how mothers and fathers interact with their child: A mother is always sure she is the mother of her child while men can not be as sure of their fatherhood; this is referred to as the principle of "paternity uncertainty" (Gaulin & Schlegel, 1980). Inclusive fitness is one of the main factors governing kin-related behavior and is the evolutionary engine for many of the acts of apparent selflessness among kin (Hamilton, 1964). The choosiness of non-human males in their investment in their offspring has been shown to be influenced by the likelihood that they are the father (Lifjeld, Slagsvold & Ellegren, 1998). The adaptive mental mechanisms shaped by the principle of "paternity uncertainty" in fathers could out of pure sensitivity contribute to a slightly lessened emotional investment on average in their children compared to that of mothers. On a darker note, it could also be an average response to *real* cues of infidelity. By the same token we would expect children to also be sensitive to the "paternal uncertainty" as it affects their expected investment from their father.

Middleborn siblings were on average the siblings reported to be closest to heart of the students (44% of the time), with lastborns (33%) more popular than firstborns (23%). However, these preferences were shown to not be different enough as to be able to say that birth order affects the choice of favorite sibling. Since the relative popularity of the middleborns could be due to the students simply preferring the closest sibling (with lastborn and firstborns ending up giving middleborns proportionately more votes), this was also tested for. The students did not have any preferred distance for siblings in the birth order, and the relative position preferences were free from effects of sibship size. If the students had tended to dislike closer siblings, one would have expected the preferred distance to have increased with increasing sibship size, as the increasing size of the sibship would allow for this, however this was not found. There were no group differences on preferred distance for closest sibling and siblings two or more steps away, even when keeping sibship size constant. All in all, these results showed birth order and birth-order sibling distance having no effect on the choice of favorite sibling (also see the birth order discussion section), though it should be pointed out that in these tests, some of the non-significant results might be due to a low n (n = 72 and 36).

About a quarter of the students (89 of 336) gave self-made gifts, constituting 8.1% of the total gift-giving relations. Of the students that gave self-made gifts, about half gave to their near-family (47), a bit less to friends (40), and about a third (30) to half-near family. There was not much overlap, with only about a tenth (7) of the students giving to all of the three categories (friends, near family, half-near family); and about two thirds (50) giving to only one. Most of the students (40) gave to friends, closely followed by parents (38), then grandparents (22), then siblings (18), and finally uncles/aunts (17).

The students gave self-made gifts a third of the time to their near family compared to their half-near family when we look at the proportion of gift-giving relations having self-made gifts (table 4.5). Uncles and aunts receive proportionately most of the self-made gifts, closely followed by grandparents. The students give proportionately more often to friends than near family, but not as often as to half-near family.

There were no significant group differences or any results indicating that the students that gave self-made gifts singled out any specific category as a recipient, however there were a lot of strong negative correlations suggesting that the students differentiate their spending; and there were no positive correlations. From the results there is a pattern which indicates that students tend to avoid combining certain categories of receivers. Siblings for example, correlated negatively with parents, grandparents and uncle and aunts, but had no correlation one way or the other with friends. This might indicate that if the students that gave self-made gifts to siblings also gave to somebody else, this probably would be to a friend.

The students that gave self-made gifts, gave more often self-made gifts to their parents (38) and friends (40), but when they gave to their aunts, uncles and grandparents, the proportion of self-made gifts given was somewhat larger: 15.2% for uncles/aunts and 9.9% for grandparents compared to 9.1% for parents and 9.3% for friends. On average, the students gave more than three quarters of the gifts as self-made to their half-near family; around half

of them when they gave to their near family, and only around a third of them when they gave to friends (table 4.6). The number of gift-giving relations having self-made gifts correlated with the number gift-giving relations in general: students that gave many self-made gifts also gave many gifts. Income was shown to not correlate with the number of self-made gifts the students gave, but when students were grouped into gift makers and non-gift makers, the group with *higher* income was shown to make *more* gifts. Money spent on Christmas gifts in total did not correlate with the number of gift-giving relations having self-made gifts and when the students were grouped into gift makers and non-gift makers, the group with *higher* spending was shown to be near-significantly ($p = 0.1$) making *more* gifts. From these results, it can hardly be claimed that the students in our sample are forced into gift-making because of low income.

Oddly enough, the enjoyment in making or buying Christmas gifts did not correlate with the number of self-made gifts given, but it had a significant group effect when students were divided into those that at least made one gift and those that made none, showing a higher enjoyment for the gift makers.

Giving self-made gifts is an interesting part of modern gift giving, and it is now thought of as somewhat of an oddity in our Western societies; a special and ever rarer part of our modern gift giving. For our stone-age ancestors, it was presumably the major form of gift acquisition, though it might not have been the only form, since one could have traded for something with the specific intent of that something becoming someone's gift.

What is clear at least is that a self-made gift can be more personal and could hold more information about the giver, the receiver and the situation than any bought gift could; indeed, some gifts may be totally unintelligible to an outsider. We did not ask the students how many hours they had put into their work or how much they valued the gift they were making, so it is difficult to separate between simple, Christmas-workshop type gifts and the more elaborate, ingenious or personal gifts. The descriptions of the gifts were also not sufficiently detailed to gauge quality, which is quite a daunting task even when you have enough information: for example how do you rate 'embroidery of a heart' to a 'self-made babysitting gift-card'? Perhaps there is a huge difference in the quality of a self-made gift to mother than one to her sister. One intriguing finding was the fact that so few gave self-made gifts to their partners and their siblings. If self-made gifts are less practical than bought gifts and more symbolic, it could be that the students give self-made gifts as reciprocal symbols of alliance rather than resource investments into their inclusive fitness. By this token you would expect self-made gifts to increase as relatedness decreases, as we see when looking at the proportion of self-made gifts given to half-near family versus near family. It might also be useful in reciprocal alliances to give gifts that can only be understood as symbolic, so that the gift gives a clear message. A pure practical gift, with money as the ultimate example, is often seen as impersonal, lacking charm and sometimes inappropriate (Burgoyne and Routh, 1991; Cheal, 1987, 1988; Lea et al., 1987; Solnick and Hemenway, 1996; Webley et al., 1983; Webley and Wilson, 1989).

There seemed to be a tradition of giving gifts together with other people among the students in our sample, only 16% procured all their gifts alone. Four times as many people in

average assisted a student in procuring gifts to family than to friends, making it a family centered tradition. In fact, 83% of the gift-giving relations with family had other people helping in compared to 29% for friends, and this difference was significant. The enjoyment in buying or making Christmas gifts was inconsequential to whether students were solitary or assisted gift givers.

5.2 Kin, partners and friends

As a trend, the students had both in quantity and quality better gift relations with near family than half-near family and non-kin, with grandparents being an exception from half-near family. The students spent on average more money on partners than family members, though not significantly more than on their children, but they received on average more valuable gifts from parents than from their partners.

Students tended to have the strongest gift relations with siblings after parents, partner and children, and even gave more money (though not significantly so) to siblings than parents. Though the students gave more valuable gifts to their siblings than to half-near family, they received more valuable gifts from grandparents than from siblings.

Regarding gift relations, friends could be placed in the middle of the half-near family, the students spent more money, but not significantly, on friends than grandparents and aunts/uncles, but they did not spend more on them than nephews/nieces or first cousins. Interestingly, students spent about the same on first cousins as they did on near-family members, like siblings. Maybe relations with first cousins simulate the combined functions of friend-based alliance and sibling alliances in a beneficial way. First cousins are usually at a similar age with each other and they do not engage in family niche conflicts in the way siblings do. The lack of competition might outweigh the lack of relatedness making students spend about the same on their first cousins as they do on their siblings.

Most often, the most expensive gifts were given to parents, and most of the gifts worth above average were also given to parents, followed by partner, children and siblings.
Of half-near family, grandparents received the most expensive gifts most often followed by nephews/nieces, uncles/aunts, first cousins and lastly friends; most of the gifts worth above average were given to nephews/nieces then grandparents, friends, uncles/aunts and first cousins. Thus we see a clear bias towards investing in close family and partner than to half-near family. When it came to investment, friends acted like half-near family.

This trend was very similar for gifts received except that grandparents more often gave the most expensive gifts compared to siblings, and gave gifts above the average more often than partners and siblings.

Looking at the correlations on money spent/money received in total per relation category, we see that in near family, siblings had a stronger correlation ($R^2 = 0.33$) than parents ($R^2 = 0.01$), in fact the correlation for parents was not significant ($p = 0.06$). Reciprocity with both grandparents ($R^2 = 0.04$) and uncles/aunts ($R^2 = 0.15$) were greater than for parents.

Partner had a much higher reciprocity ($R^2 = 0.54$) than any family member – unfortunately, we did not have the price of the gifts received from friends, so we could not check for a correlation on money spent/money received.

Out of all the single categories of receivers, friends received most gifts (mean 2.5), but many students chose not to give to friends at all (34% did not give). Looking at the correlation between gift-giving relations and gift-receiving relations with friends, we see that there is a very high degree of reciprocity ($R^2 = 0.94$); the students gave to the same friends they got from. This suggests that there exists a form of social gift-giving contract among friends: that the students have mutual agreements with specific friends on whether to give or not give gifts. This kind of pattern is not so clear for the near family or the half-near family. The reciprocity correlations are stronger for non-kin (partner $R^2 = 0.81$, friends $R^2 = 0.94$) than kin (siblings $R^2 = 0.84$, grandparents $R^2 = 0.66$, parents $R^2 = 0.40$, uncles/aunts $R^2 = 0.27$) with the exception of the correlation for siblings being stronger than for partner. We see that reciprocity is more relaxed among kin than non-kin, especially relaxed between students and parents, and as we move to half-near family the reciprocity increases with regards to parents. Siblings on the other hand show the largest reciprocity in the family when it comes to money spent/money received in total. Siblings differ from the other near-family members in that they are more often in competition with each other, this might prompt siblings to create a more alliance-based gift-giving dynamic than with other family members; hence the greater reciprocity between siblings. In fact, siblings had a very similar gift-giving/gift-receiving relations correlation to friends (see above).

As a general result, we found that money spent on family correlated strongly with their coefficient of relatedness; the more related, the more the students spent on the family group, which is in accordance with other findings (Belk, 1979; 1982; Borch 1994; Caplow, 1982; Saad and Gill, 2003; Mysterud et. al., 2006).

Partner had a tendency to break the trend and stand out as a high quality relation among non-kin, as has been shown in other studies (Borch, 1994; Bussey et al., 1967; Caplow, 1982; Cheal, 1986; Essock-Vitale and McGuire, 1985; Mysterud et. al., 2006).

The overall results lend support to the hypothesis of differential gift investment being a universal feature in humans (Essock-Vitale and McGuire, 1985; Daly et al., 1997, p. 282; see also Buss, 1999, ch. 8; Cunningham, 1985; Rossi and Rossi, 1990).

We also looked at other factors that could affect gift-giving dynamics and these (5 factors) were frequency of encounters, spending Christmas together, living together, emotional relation and age. We tested a selection of relation categories, namely mother, father, oldest sibling, youngest sibling, mother's mother and father's mother and one male friend for men and one female friend for women (if the students gave to more than one friend we chose the first friend they reported). We did not have data for all categories on every factor tested. The factors were tested against money spent or received per relation.

Frequency of encounters
Frequency of encounters correlated significantly with money spent and money received for all ($p < 0.03$), and was the most striking of the five factors. The students that lived with the person were excluded from the test. Arranged after coefficient of determination (R^2), the ordering for money spent on person was as follows: Male friend, female friend, oldest sibling, mother's mother, father's mother, youngest sibling. Not surprisingly, the students' spending on friends correlated strongest with frequency of encounters, with men having slightly higher correlation with male friends ($R^2 = 0.20$), than women with female friends ($R^2 = 0.18$). The students seemed to require more encounters with oldest sibling ($R^2 = 0.08$), compared to younger ($R^2 = 0.03$), and also more with mother's mother ($R^2 = 0.06$) than father's mother ($R^2 = 0.04$).

Friends stand out; even the highest coefficient ($R^2 = 0.08$) for oldest sibling is quite lower than the lowest coefficient for friends ($R^2 = 0.18$). The value of gift being given is more dependent on meetings for friends than any of the family members. This is supportive of friendships being alliances, and that these alliances require maintenance. This is not as obvious for family members, lending support to previous findings which suggest that inclusive fitness moderates the need for reciprocity in alliances (Hartup and Stevens, 1997; Trivers, 1974).

Why older siblings have a larger coefficient than younger is hard to explain, but perhaps it could be due to a confounding with age. Unfortunately, we did not record the ages of siblings, so it cannot be tested. The difference between mother's mother and father's mother is so slight that an attempt at explaining lies outside the scope of this thesis.

The results from frequency of encounters and money received were quite similar, except that we do not have data on money received from friends. The ordering after the coefficient of determination (R^2) was as follows: Father's mother ($R^2 = 0.07$), oldest sibling ($R^2 = 0.05$), mother's mother ($R^2 = 0.04$), youngest sibling ($R^2 = 0.01$). Here we see that there again is only a slight difference between the grandmothers. Grandmothers have also switched position in the line-up compared to money spent, with father's mother now having a stronger correlation than mother's mother.

Spending Christmas together
Spending Christmas together affected money spent and money received quite dramatically. The differences between spending/receiving when spending Christmas together compared to when not, was significant for all categories of relations ($p < 0.05$) except for mother and oldest sibling (both near-significant: $p = 0.06$). The fact that spending Christmas with mother did not show any difference in money received could reflect the power of "maternal instinct", and the fact that there was a significant difference for father: the "paternal uncertainty/maternal certainty-principle" (the mother is always sure that she is related to her offspring, but the father may never be completely sure).

Spending Christmas with oldest sibling did not show any difference in money received. This could be due to a birth-order effect, since the older siblings are firstborns and the

youngest siblings are lastborns (also see the birth-order discussion). It has been documented that firstborns are less outgoing and social, but more willing to invest in the family than laterborns (Sulloway, 1996). The combination of these two traits might explain why the value of gifts given seem to be less affected by spending or not spending Christmas with student for oldest sibling than youngest sibling.

Living together
The students were only asked if they lived with their siblings or their parents. The effects of living together was less prominent than spending Christmas together; in fact the only significant effects were on spending on mother, father and youngest sibling. There were no effects on money received. The students spent the least amount of money on their oldest siblings compared to any of the other family members when living with the family members; however, the difference between spending when living and not living with oldest sibling was not significant. This again could be due to birth-order effects, since students giving to oldest sibling have to be lastborn or middleborn, and middleborns and lastborns tended to give less money to sibling than firstborns (see the birth-order discussion).

Emotional relation
Emotional relation had no effect on money spent on or received from mother, mother's mother or father's mother, though it had an effect on both spending on and receiving from father. One possible evolutionary explanation for the significance of the correlation of emotional relation with father, lacking for mother, might again be the principle of "paternity uncertainty" (Gaulin & Schlegel, 1980). Fathers could check their resource investment in their children based on their emotional relation to the children if the emotional relation can act as a gauge on paternity. We did not ask students for their emotional relations with their siblings, though we asked them who their favorite sibling was, and in sibships of size three we found that the students spent a lot more on the favorite sibling than the other one. This striking differential investment on the siblings makes gift giving a good predictor of sibling conflict (see also the birth-order discussion).

Age
Age was the least interesting factor affecting money spent and received; and was significant in only 1 of the 20 cases we tested for: Students received more money from father the older they were. Exactly why fathers spent more money on students as they got older, is not at all clear, but it might be that the older students get, the more difficult it is for fathers to find the gifts they want to give while keeping the price steady, and that this somehow is easier for all the other categories. All in all age is a bad predictor of the value of spending or receiving Christmas gifts.
Though, it should be noted that the students in our study were of a homogenous age-group, with 84% of the students between 19 and 25. With these small age-differences, any effect of age should not be expected to be as large as in normal age-group populations.

Self-made gifts
Neither living with, spending Christmas with, emotional relation to or frequency of encounters with any of the persons tested for, had any effect on whether a gift was given as a self-made gift or not.

5.3 Civil status

As a general trend, single students and students with partner invested more in their own kin (excluding children) and friends than married and cohabiting students did.

When a group (for example married students) is described as "tending" to be different from another group (for example single students), this should read different, but not necessarily significantly different. When groups are explicitly described as different, this should read significantly different. Bear in mind that neither sex nor age ever interacted significantly with the effects of civil status in any of the tests.

Married students tended to have the most gift-giving relations, but also the least gift-receiving relations. They differed significantly from students with partner in gift-receiving relations with all gift-givers and family gift-givers; but they did not differ from students with partner when it came to friends. Married students tended also to get least gifts and got less than students with partner. These tendencies seem to show that married students are dutiful in their gift giving, but that there is a lack of reciprocity on the part of the receivers. Perhaps the social costs of married life, subtracts from maintaining other social bonds and that it is the effects of this that is observed through the lack of gifts reciprocated. Still, married students were the only that had a non-significant correlation on money to/from partner. With married students, the correlation of enjoyment in making or buying Christmas gifts with number of gifts given was not significant for any of the groups of receivers we tested for (all, genetic family and friends), suggesting that married students in our sample were dutiful, procuring gifts irrespective of how enjoyable they found it - still, along with students with partner, married students tended to enjoy buying or making gifts the most. When looking at the reciprocity of gift-giving relations to gift-receiving relations, married students were overall most reciprocal, again enforcing a sense of dutiful disposition - with the exception of reciprocity with husband/wife, which was the most relaxed of all the students in relationships. Finally, married students were more likely to have at least one gift-giving relation where a self-made gift was given than any of the other students.

Cohabiting students spent more money on their partners than married students and students with partner did, and they tended to invest least in friends and family (children excluded). Perhaps cohabiting represents a type of intensified courtship (having moved in with a partner, but not yet married) channeling resources otherwise spent on friends and family to partner. Cohabiting students tended to spend somewhat less than married students on both friends and family (children excluded). Maybe the married students represent an end of this intense courtship period. In general, cohabiting students can be said to be the least gift-active of the four groups of civil status. They tended to have the strongest correlations with enjoyment in making or buying Christmas gifts with number of gifts given, indicating emotional enjoyment guiding gift giving to higher degree than for the others. They were average among the civil-status groups in how they enjoyed procuring gifts. Cohabiting students' reciprocity in gift-giving relations to gift-receiving relations reveals the weakest reciprocity toward friends of the civil status groups. These results are indicative of a

focused motivation on courtship. The reciprocity with their partner was strong, more so than for married students, but weaker than for students with partners. Cohabiting students were least likely to procure all the gifts by themselves, possibly buying most of their gifts with their partner.

Students with partners were the most active students of the four civil status groups. In general, they tended to receive from most persons. They had more gift-receiving relations than married in total (excluding children, partner and partner's family) with genetic family (children excluded) and along with single students they tended to get most gifts overall, and got significantly more gifts than married students. They tended to have most gift-giving and gift-receiving relations with friends and tended to give to and get most gifts from them. In general, they tended to spend more money and spent more than cohabiting students. Along with single students they tended to spend most money on friends and genetic family (children excluded). The gift dynamics of students with partners seem to indicate that they are socially inclined. They spend on average, slightly more than married on their partner (NOK 703 against NOK 683), but less than cohabiting students (NOK 793), and they maintain an above average non-kin gift-group in their friends. They are often in a less committed relationship than cohabiting students and can afford more time and resources to focus on their friends and own family. Students with partners tended to enjoy buying and making Christmas gifts more than any of the others, they liked it significantly more than single students. The enjoyment in procuring gifts correlated twice as much with gifts given to family than to friends, and the degree of correlation for family had roughly half the strength of the others groups. Students with partners tended to be more dutiful than single and cohabiting students in giving to family: cohabiting students tended overall to be less dutiful and single seemed to be less dutiful to family than friends. Looking at reciprocity of gift-giving and gift-receiving relations, students with partners behaved more like single students being markedly less reciprocal towards family than both cohabiting and married students; they were twice as reciprocal toward friends as family. Students with partners had the lowest reciprocity towards family of the civil status groups and this coincided with the lowest correlation of enjoyment in gift procuring and gifts given to family. They were the most reciprocal with their partners of the civil status groups, also indicating a clear attention on partner. It seems as though they are retaining their commitment to their friends while being in a relationship on behalf of their family.

When children, partners, and partners' family were removed from the receivers (as to not create any bias against single students) single students had a tendency to give most gifts; and along with students with partners receive most gifts and have most gift-receiving relations. What typifies single students in our study is that they spent least money in total of all the civil status groups, but that they tended to spend most per receiver and per gift. They spent more per receiver than cohabiting students in general and to genetic family. Along with students with partner, single students had a tendency to invest most money on friends. Even when children, partners and partners' family were removed from the receivers, single students had a tendency to spend more money in total on family than both married and cohabiting students, but they had a tendency to have fewest gift-giving relations in total and with family. The combination of large spending with few receivers, suggests that single students focus their resources. Perhaps their gift dynamic is a manifestation of being less

social than students with partners, but with more time to spend socializing than married or cohabiting students. Single students tended to enjoy buying or making Christmas gifts least and enjoyed it significantly less than students with partners. From the correlations of enjoying gift making or gift buying with gifts given, partners tended to be most dutiful to friends.

Along with tending to have the most gift-giving relations with and give the most gifts to friends, this could indicate that single students, more than the others, mitigate friendship with gifts even when they don't like procuring them. Single students behaved very similar to students with partners when it came to reciprocity in gift-giving and gift-receiving relations, with an almost twice as large correlation with friends than family. Single students also had the lowest reciprocity overall. They were more likely than the others to procure all the gifts by themselves, probably due to them not buying any gift with a partner; and they were least likely to make be gift maker.

5.4 Sex differences

In general, sex was one of the strongest predictor variables in explaining the variation in most of the different gift-behavior dynamics.

Overall, women gave to more people, they gave more gifts, they spent more money in total, they received from more people and they received more gifts than men. Men spent more per gift, and had a tendency to spend more money per receiver than women.

Women gave on average to 14.3 people and received from 10.1; men gave on average to 9.6 and received from 7.5 (the numbers for gift-giving relations were a bit lower than for gift-receiving relations due to the structure of the questionnaire; the participants were asked more questions about gift giving than gift receiving). When the gift-giving relations are with the same people as the gift-receiving relations, the gift-giving relations adjusts to 9.4 for women and 6.7 for men. These numbers are consistent with other findings (Fischer and Arnold, 1990; Mysterud et al., 2006).

Women were the most active of the sexes in gift giving. They spent much more money on gifts than men (NOK 1,870 and 1,396, respectively) and they gave more gifts to gifts to more people (Mysterud et al., 2006 found NOK 1,859 for women and NOK 1,143 for men). Interestingly, another Norwegian study (Borch, 1998) found the amount of money women *planned* to spend on gifts was *less* than the amount men planned to spend. Because women tended to give to more people, men and women spent about the same amount of money per receiver, with men tending to give slightly more than women but not significantly so. Looking at money spent per gift, however, the difference in spending became significant. Even with women spending considerably more money in total, men gave more expensive gifts than women due to the difference in the number of gifts given (13.3 for women, 8.1 for men).

These trends held for gift-giving dynamics within the family; however, the differences between the sexes were not so striking; women spent on average NOK 986 on family, while men spent NOK 896; and men had 5.5 to women's 6.2 gift-giving relations with family. An interesting finding was women's strong investment in the family of their partner compared to men. The women that had partners gave in total 88 gifts by themselves to various members of the family of their partner compared to men giving 33.
On average, women gave to and received from more than twice the number of friends than men did, as is consistent with other findings (Argyle and Henderson, 1984; Borch, 1994; Essock-Vitale and McGuire, 1985; Mysterud et al., 2006). In total, women spent NOK 339 compared to men's NOK 160 on friends.

There was a striking sex difference in the gift dynamics with friends, women tended to give to women and men to men. Interestingly, even though women gave to more friends than men did, 540 and 248 respectively, men gave to more female friends than women gave to male friends, 81 and 68 respectively. 33% of men's gift-giving relations were with women compared to women's 12.6% with men. Women spend only NOK 43 on men (12%) compared to men's NOK 56 (35%). Men seem to be less choosy when it comes to which sex they give gifts to and spend money on. It is unlikely to think that the female students in our study should have less male friends than our male students have female friends, and this has in several other studies shown not be the case (Booth, 1972; Buys & Larson, 1979; Dunbar & Spoors, 1995; Hartup & Stevens, 1997). It is more likely that these results in fact reflect a differential gift behavior where women specifically target women more often than men as a part of establishing and maintaining a social network with them. It has been shown that women seek out and maintain more complex and committed social relationships than men (Geary, 1998; Golombok and Fivush, 1994; Turner, 1982), and it seems from our results that their female friends constitute an important aspect of this.

Harvesting the fruits of a large favor lending or resource lending reciprocal social network of women would be especially beneficial in times of pregnancy or breastfeeding, when the woman is in need of a higher level of resources and aid. The continual shared problems of women (i.e. pregnancy, child rearing, protection against men) would help in mitigating the reciprocity of the female alliance (Smuts, 1995).

That men seem to invest more of their resources in women than women do in men might reflect an extended courtship behavior evident in men, but not in women (Buss, 1994); nevertheless, as discussed above it is likely that men do not use gifts in the same manner as women in mitigating friendship-alliances, and it may be suggested that they have a more person-oriented than gender-oriented gift behavior.

Compared to the general result section, where we saw that mothers were significantly preferred by the students, here it is fleshed out that it is only significant for men - being the main contributor to the difference. From the arguments of inclusive fitness and the principle of "paternity uncertainty" (Gaulin & Schlegel, 1980), we suggested in the general discussion an evolutionary explanation to the difference between the emotional relation with mother and father, but it did not account for why this difference is mainly between father and son. Although being closely related, with common genetic interests prompting cooperation, the interests of family members are not identical; and it has been shown that

although women and men felt equally competitive, men in contrast to women, felt competitive when it came to resource acquisition, and that men's competition for financial success was correlated with aspects of mating competition (Cashdan, 1998). Sharing half of their genes would prompt fathers and sons to compete less than unrelated males; however, this does not exclude the possibility of them competing for sexual access to women. When women compete with each other for men, they mainly do this by lowering the perceived sexual reputation of their rivals by slandering (Buss & Dedden, 1990). This strategy differs from the men's; whereas men would directly attempt to heighten their own fitness (although at the expense of their inclusive fitness) in competition with a male relative, women attempt to lower the fitness of the competitor so that as a by-product her own increases. If mother and daughter were to compete, it could represent a greater lowering of inclusive fitness for them than for the father and son because the impression of lowered status caused by the slander could reach the attention of more people than just the man competed. This could potentially lower the inclusive fitness to a level where the costs pass the benefits of the slandering woman's own increased fitness.

Also, the difference between the sexes in competition for mates is founded in the way the sexes represent a resource to each other. The resource distribution from men to women is a continuous event; however for a man the resource a woman represents is *not only* continuous: if a woman he has invested in gets pregnant with another man, all the resources he has up to that point invested in her would in an evolutionary sense amount to nothing. In addition to losing the resources he has already invested, he might risk future investment in a child that is not his own, channeling his resources away from his own current or future children resulting in a dramatic potential lowering of his fitness.

We also found that the relation with mother correlated with the relation with father for both sexes, but that the correlation was almost twice as large for men than women. Even though mothers tended to be liked more than fathers, they seemed to get more extreme scores of both low and high while fathers got more average scores. Women tended to do this more than men, hence the lower correlation. This might indicate that the students have tighter and more intense emotional bonds with their mothers for good or worse, while the bonds with the father are more distant, making the emotional extremes fewer. This fits well with evolutionary theories of differentiation of parental investment, with the father giving more practical support and mothers giving more emotional support. In the EEA of humans men mainly hunted and women mainly foraged. In many hunter-gatherer societies today, women usually forage taking the children with them, while men go out in hunting expeditions (Tooby & DeVore, 1987). Being this close to the mother through the generations could very well have selected for mental mechanisms in the children making them expect a certain form of emotional contact with their mother, but not necessarily with their father. If hurt or sick, for example, they would have to run to their mother with their father away hunting.

Neither of the sexes preferred the sibling closest of heart to be of a specific sex. This topic is covered in the birth-order section.

There was a big difference in the reported enjoyment in buying or making Christmas gifts between women and men. Women (mean 6.5) were almost two points above men (mean

4.7) on a scale from 1 to 9. This explicit difference is in compliance with women's more active gift-giving behavior in general. That women report the act of making and giving gifts as more enjoyable also lends support to the possible existence of evolved mental mechanism governing gift behavior rather than that the differences between the sexes in gift behavior being inspired by conceived gender-specific social duty.

Both men and women gave more gifts the more they enjoyed buying or making them; the coefficients of determination (R^2) were higher for gifts given to family than to friends: they gave to friends less respective of the enjoyment in procuring gifts than they did to family. This seems to substantiate the differences in the reciprocity of kin-alliances and friendships-alliances. The correlations of enjoying gift giving with the number of gifts given were stronger for men than women, indicating that men need more motivation in gift giving than women.

Both sexes had strong correlations between gift-giving and gift-receiving relations; with friends it was particularly strong, and almost twice as strong as with family. Women and men had almost identical coefficients, but women were more reciprocal than men overall. This difference in reciprocity may reflect a more general disposition of women being more dutiful than men, but it could also reflect the differences in the evolved capacities for gift behavior in women.

Almost three times as many women (60) as men (22) made at least one of the gifts they gave. Even though women on average give more gifts than men, this result is still much larger in proportion to the difference in sheer number of gifts. If self-made gifts represent a more symbolic gift than a bought gift, this result reinforces the findings that women more than men spend efforts in maintaining reciprocal alliances.

Men were shown to significantly procure more gifts by themselves than women. This might be due to a larger disinterest in planning Christmas buying with other people, but also due to a desire to be the sole benefactor. Procuring a gift alone clears doubts about who paid for the gift, how much each paid, who had the idea and so on. It has been shown that men place higher emphasis on price than women (Rucker et al, 1991). Maybe this leads the male students to more often procure gifts alone to bring a focus on them as providers.

5.5 Birth order

Overall, there was a tendency for firstborns to spend more money per receiver, more money per gift and more money in total; they tended to receive the most expensive gifts and have the most active gift-dynamics. Middleborns tended to have more gift-giving relations, gave more gifts, had more gift-receiving relations and received more gifts. Lastborns along with firstborns tended to receive the most expensive gifts, but have least gift-giving and gift-receiving relations and both give and receive least gifts, and be generally least active. Middleborns tended to invest least in family, but slightly more on friends than firstborns; and lastborns tended to spend more money on friends, but gave to fewer friends. See

figures AF1 to AF6, and tables AT9 and AT10 in the appendix for an overview of these trends.

The significant results from the tests give a much less coherent picture than the overall tendencies noted above. They are summarized in tables AT6a and AT6b, and will also be discussed below. Significant results are counted in tables AT7 and AT8.

Summing up the significant results for firstborns, we see that when it comes to genetic family where siblings have been removed, firstborns had more gift-receiving relations than either middleborns or lastborns, and they also received more gifts than them. Although, when it came to near family they received fewer gifts from their parents than middleborns and lastborns as a group, but, though not significant, the gifts were more expensive. Firstborns gave more gifts to half-near family, they had more gift-receiving relations with them, they received more gifts from them and the gifts they received were more expensive. These results show firstborns being more family oriented, especially when we look at how they invest in their half-near family. This is consistent with other findings (Mysterud et al., 2006) and supports the hypotheses that firstborns are family-oriented (Salmon & Daly, 1998).

When it comes to friends, we see that firstborn with younger sibling of opposite sex had significantly more gift-giving relations than lastborn with older sibling of same sex, and the same is true of gift-receiving relations. This result seems to reflect a general trend that students with closest sibling of opposite sex tend to give more gifts to and have more gift-giving relations with friends than students with closest sibling of same sex (figures AF5 and A6). Perhaps boys with a sister as a close sibling learn to be better gift givers? Unfortunately, pursuing this speculation is outside the scope of this study.

Looking at the significant results for middleborns, we see that age-gap laterborns (the middleborns that are more than six years younger than their nearest older sibling) have more gift-giving relations than laterborns (lastborns and no-gap middleborns) with all receivers in general. The same is true for gifts given to all relations, but here age-gap middleborns give significantly more than firstborns as well. Middleborns have the most gift-giving and gift-receiving relations with their genetic family. Age-gap middleborns give more gifts to their genetic family then laterborns and firstborns, however not after removing siblings - then middleborns end up giving *least* gifts to their genetic family. It seems that the amount of relations and gifts of middleborns are tied to whether siblings are included in the tests or not -this is probably due to middleborns, unlike firstborns and lastborns, never having less than two siblings, thus more persons to give to or receive from. And we do see that they give to and receive more gifts from their siblings, and they spend more money on their siblings in total. Middleborns spend less on their mothers than only-children, and they receive the least valuable gifts from their genetic family and their half-near family. They spend least on their grandparents but most per friend. Mysterud et al. (2006) also found that middleborns spent most per friend, and these results are supportive of other findings suggesting that middleborns focus more on non-kin reciprocal relations (Salmon, 2003) and develop a network of support outside the family (Sulloway, 1996). Middleborns spending the least on both mother and father than the others and significantly less on their mother

than only children and significantly less on their grandparents than the others is perhaps the strongest indication in our findings that middleborns are less family centered (Salmon & Daly, 1998), less influenced by kin ties (Salmon, 1998) and have reduced closeness to parents (Kennedy, 1989) than the others. Middleborns have also been shown to score lower on tests of family solidarity and identity (Salmon, 1997) than the other birth-order groups.

Lastborns were the least active in gift behavior among the birth-order groups. They had the least gift-receiving relations with and got the least gifts from the gift givers as a whole. They also had least gift-receiving relations with their genetic family. There were no other significant findings for near or half-near family. When it came to friends, lastborns with nearest older sibling of same sex received fewer gifts and had less gift-giving and gift-receiving relations than firstborns with nearest younger sibling of opposite sex and only-children. The same sex-pattern lastborns spent less money on friends in total than only-children and firstborns with nearest younger sibling of opposite sex, and also lastborns with nearest older sibling of opposite sex. And finally, lastborns with nearest older sibling of opposite sex spent more *per* friend than middleborns and lastborns with nearest older sibling of same sex (see figures AF5 and A6). The results from lastborns indicate an overall disinterested gift behavior when compared to the other birth-order groups, both when it comes to family and friends. This might reflect that lastborns often tend to be the centre of attention in a family, not needing to prove anything inside or to seek alliances outside the family. Parents deciding to not have more children are free to allocate all their available future resources on their fledgling lastborn, as it represents their terminal vehicle of reproductive output (Sulloway, 1996). This could affect the personality of the lastborn if the focus occurs in the formative years of personality, and especially with the firstborn and/or middleborn already grown. Growing up, they are confronted with the occupied family niches of their rebellious closest older sibling (now middleborn) and the more distant and family-centered firstborn. Our results indicate that lastborns pertain to a less family centered disposition than firstborns and a less defined need for alliances outside family than middleborns. Although there were mixed results from friends; firstborns spent more money in total on friends, (though not significantly so), perhaps valuing fewer relations more than the other birth groups.

When we counted the instances of maximum values of all tests regardless of whether they yielded significant results or not, firstborns got a total of 39, middleborns 20 and lastborns 14 out of 73 counts. A Pearson crosstabulation reported these results to be significantly different from each other. Table AT9 shows this count and others, and AT10 shows similar counts categorized into genetic family, genetic family without siblings, half-near family and friends. From table AT9 we also see that there is a significant difference between the birth-order groups on money spent in general, with firstborns getting 25, middleborns 4 and lastborns 8 out of 37 counts. In all instances where something was given, which includes gifts given, gift-giving relations and money spent, firstborns got 29, middleborns 12 and lastborns 9 out of 50 counts, and these were significant differences. Though the trend was the same for the maximum counts of receiving, there were no significant birth-order differences there.
When focusing on genetic family, genetic family without siblings, half-near family and friends and lumping receiving together with giving, we still see the same trend: firstborns

get 22, middleborns 10 and lastborns 4 out of 36 maximum counts, all significantly different from each other. Along with figure AF1 and AF2, these results clearly agree with the tests that yielded significant results and help to sum up the chapter: Firstborns are more active and dutiful in gift giving across the board; they are family centered, both when it comes to near and half-near family and they are just barely passed by middleborns in gift giving to friends.
Middleborns are least family centered; markedly different from the others when it comes to near family, and somewhat more disinterested in half-near family than lastborns. But they surpass firstborns in their investment in their friends. Lastborns' gift dynamics tend to lie somewhere in between firstborns' and middleborns', but with an interesting twist to their investment in friends: they give the least gifts and have the least gift-giving relations, but they spend the most money.

We also got some significant results with two other ways of arranging birth-order categories, namely age gap and sex pattern .The age-gap arrangement was specified to extract from firstborns, middleborns and lastborns, three suspected functionally disparate groups: firstborns that were more than six years older than their younger sibling, middleborns that were more than six years older than their younger sibling, and lastborns that were more than six years younger than their older sibling. This coding and a more simplified version using only firstborn, age-gap laterborn and lastborn are described as AGEGAP2 and AGEGAP1, respectively, under 'Categorization and coding of data' in Materials and methods. The general comparison between the categories of AGEGAP2 is depicted in figures AF3 and AF4. There are many interesting aspects of gift dynamics revealed by AGEGAP2; we refer to the figures and the significant results obtained using the categorization, which came from testing money spent on mother - showing only-children spending more money than middleborns - and gifts given to genetic family without siblings - showing only-children also giving more than middleborns. Unfortunately for us, the problem with AGEGAP2 was that the groups varied greatly in size with many being small, for example consisted age-gap middleborns of only 6 students. This made analysis difficult and reduced the potential significant yield. Perhaps other studies with larger samples than ours might apply this categorization and get a greater degree of significant results.

The sex-pattern (SEXPATTERN) arrangement attempted to test whether growing up with a sibling of same or opposite sex had any effect on gift behavior, and was intended to be a supplement to the ordinary LBO, QBO, FL, AGEGAP1 or AGEGAP2-tests. As described under 'Categorization and coding of data' in Materials and methods, SEXPATTERN was organized into only-children, firstborns with younger sibling of opposite sex, firstborns with younger sibling of same sex, middleborns, lastborns with older sibling of opposite sex, and lastborns with older siblings of same sex. To keep factors at a manageably low number (6) and to have groupings of similar sizes (n = 40 to 70), middleborns were not subdivided. The results of using this categorization were that lastborns with older sibling of same sex invariably were the least active in five tests of gift dynamics with friends (table A7a/b); this is depicted quite clearly in figure AF5 and also to a lesser degree in figure AF6. From figure A6 we also see that lastborns with older sibling of opposite sex quite clearly separate from the other groupings all along the curve, showing a larger gift activity almost reaching

the level of only-children - this is quite interesting since lastborns in general were quite low in activity. Clearly something is going on. As noted earlier, maybe for men growing up with a sister as a close sibling stimulates their gift-giving behavior and that effect is showing up on our tests. It could also be that the niches within a sibship more easily overlap if the sexes of the competing siblings are not the same. It would nevertheless have been interesting to investigate the effects of this categorization more closely, but unfortunately it is outside the scope of this study.

Firstborns had the strongest emotional relation with their parents overall. Their relation with their father was particularly higher than for the others. While still high, the relation with their mother was slightly lower than for lastborns. They did not prefer any parent to the other and was of the birth-order group to have the most similar rating on emotional relations with their parents. Our results show that firstborns relate more strongly to their parents and this is in accordance with other findings (Sulloway, 1996). Middleborns reported the lowest rating for parents which gives support to other findings that they generally are more detached from their family than the others (Salmon and Daly, 1998). Also, middleborns have been shown to report less emotional support from parents (Kennedy, 1989; Salmon & Daly, 1998). Lastborns was shown to be tangent to firstborns in their relations with their parents. Though the difference was not significant, laterborns rated their fathers lower and their mothers higher than firstborns did.

There were no group differences or correlation in birth order with how much the students enjoyed making or buying Christmas gifts, but firstborns had the lowest score. However, firstborns were the only birth-order group that had no correlation between the enjoyment in giving gifts and the number of gifts given to family, again indicating a sense of commitment to family for firstborns. Interestingly, they had twice as strong correlation with the enjoyment in giving gifts and the number of gifts given to friends than both the other birth-order groups, suggesting that firstborns need more motivation in gift giving with friends than family.

We found no effects of birth order on the proportions of self-made gifts given; in fact the proportions of self-made gifts given were very similar: 25.6% for firstborns, 21.6% for middleborns and 24.1% for lastborns.

Although we found no effects of birth order on the proportions of self-procured gifts given, lastborns had less of these than the others – the proportions being 17.5% for firstborns, 18.3% for middleborns and 12.1% for lastborns.

When looking at sibling closest to heart, we only counted the students in sibship sizes of three, one firstborn, one middleborn and one lastborn, as to not have a large group of middleborns getting proportionately more votes than the others. Though only near-significant ($p = 0.055$) firstborns were reported least often to be the favorite sibling (16 out of 46 times); likewise, though not significant, middleborns were reported most often by the others to be the favorite sibling (28 out of 43 times). Perhaps a trifle ironic that middleborns tended to be the favorite sibling since they were the group most seldom to report a sibling as the person closest to heart - 5% of the time. Firstborns favored siblings 7% of the time

whereas lastborns decidedly were the most generous and awarded their sibling as person closes to heart 17% of the time. Middleborns also reported a family member as closest to heart most seldom (32% of the time), lastborns did it most often (52%) closely followed by firstborns (42%). These results add weight to the other findings indicating that middleborns are less family-centered than either firstborns or lastborns, as has been found in a similar study, which also measured birth-order effects on person reported to be closest to heart (Salmon, 1997). Birth order had stronger effects than sex on the choice of favorite sibling. This agrees with family niche and sibling conflict in that it is expected that siblings will be in more conflict as their niches overlap. Birth-order effects will be more important than sex effects since age has more impact on size and general competitive ability in the formative years of personality.

Looking at the correlations describing reciprocity in gift dynamics, we see that all the students regardless of place in birth order had gift-giving relations strongly correlating with gift-receiving relations. And as with the groupings of sex and civil status, we see that there are stronger correlations for friends than family. Although minuscule there is a tendency for middleborns to be more reciprocal than the others in relation to family, and lastborns being more reciprocal in relation to friends.

5.6 Conclusions

At the very start of the discussion, we listed nine predictions that both we and Mysterud et al. (2006) made. We now summarize first the findings of this study, and then we compare the results of the predictions with Mysterud et al.

The students in our sample spent approximately twice as much per near-family member than half-near family member (figure 4.1 and table 4.5), approximately following Hamilton's rule (see table AT11 for definition). First cousins represent an interesting exception to the rule as the students spend about the same per first cousin as siblings. We speculate that first cousins represent a special kind of alliance: first cousins do not engage in family niche conflict, their relatedness assures less conflict than with strangers and they are usually of the same generation; these factors together prompt a logical outset for alliance. Students spend about twice as much on their children as they do on parents and siblings, as can be expected since their children represent the vehicle of fitness with longest future reproductive output. Friends are placed among half-near family, but partners are the non-kin that stand out; students spend most on them, more than twice than on children. Investment in partner represents future investment in children. Following the strict logic of Hamilton's rule, this gives the prediction that if students spend twice the amount on their parents than on their children, a partner is valued as two (future and/or present) children.

Prediction 1, that kin will be given more unreciprocated help than non-kin, with close kin receiving the most unreciprocated help, was partly met, with some interesting exceptions. Looking at 'reciprocity per person' in table 4.3, we see that parents have a very low reciprocity (0.21 for mothers and 0.22 for fathers), much lower than for aunts (0.41) and uncles (0.39), but grandparents have the lowest reciprocity of all (0.15). Siblings (0.71) had the highest reciprocity recorded in the family. Since we did not record gifts received from nephews/nieces or first cousins we do not know the reciprocity with them. That our results differ from the predictions of Essock-Vitale and McGuire (1980) might be due to the studies they reviewed mostly had qualitative data and that our study does not capture this aspect (as we only recorded monetary value). Also if the gift-relation categories were grouped together in near-family and half-near family, the subtleties that we observe could have disappeared from their findings. Nevertheless, if we consider the evolutionary implications of these discrepancies from the prediction, we can posit that sibling conflict leads to a more alliance-based relation and if so it then makes sense that the reciprocity is closer to non-kin and at least is higher than with parents. For the grandparents the grandchildren represent a greater reproductive potential than their own children and presumably themselves, so it makes sense that they invest heavily in them, giving them gifts that the students, at least with their student income, are at a loss to reciprocate. Mysterud et al. (2006) did not report money received in general, only the most valuable gifts, so we cannot use money to calculate reciprocity in their study. They did however report that kin are less reciprocal than non-kin using gift-giving and gift-receiving relations. They also reported a finding which we could not, namely that first cousins seemed to reciprocate very well. Of the 10 students that gave and received from their first cousins, only 1 student gave unreciprocated gifts and only 1 got unreciprocated gifts.

Prediction 2, that kin will be given more help than non-kin, with close kin receiving the most help, fit rather well with some few exceptions as was exemplified above (see also table 4.3). The students invested in friends about as much as they invested in their half-near family, but including first-cousins sets them lower and is in agreement with the prediction. Mysterud et al. (2006) found results that were strikingly similar to ours; they found significant correlation between the coefficient of relatedness and money spent, and their data fit well with the expectation from Hamilton's rule. Their data was nearly identical to column 3 in table 4.3 with the only distinct exception being first cousins receiving much less money than in our sample, less than half, about the same amount as aunts. This is a puzzle indeed. Perhaps this is due to spending on first cousin being sensitive to a low n (ours 132 to theirs 10, table 4.1), or that the higher age or specific life situation (being a graduate student) somehow affected the spending on this group. Nevertheless, the findings of Mysterud et al. (2006) were in general very similar to ours.

Prediction 3, that friendships will be reciprocal. Since we did not record the value of the gifts received from friends, we could not use the same monetary reciprocity calculations as we have done above, but when looking at reciprocity for gift-giving and gift-receiving relations it is close to 1.0, a bit larger actually (1.12), showing a very strong reciprocity between friends supporting the prediction. Mysterud et al. (2006) reported similar strong reciprocity; out of their 50 students only 4 had a non-reciprocated relation with their friend.

Prediction 4, large gifts and long-term loans are most likely to come from kin. Disregarding "long-term loans" for obvious reasons, we tested this prediction by measuring who gave the students the most expensive gifts the most often and who gave the gifts worth more than average most often. Our results supported the prediction with parents giving most often the most expensive gift (57%), followed by grandparents (23%), siblings (8%) and uncles/aunts (3%). As an exception from non-kin, partner came in just above grandparents with (30%), but as we have discussed, investing in partner can also be an investment in future or current reproductive effort. The same was true for gifts above average, with parents coming first (38%), then grandparents (17%), then partner (14%), then siblings (2%) and lastly uncles and aunts (0.6%). Mysterud et al. (2006) reported very similar results showing parents (44%) giving the most expensive gifts most often, followed by partners (15%), grandparents (10%) and siblings (8%). Like us, they did not report from friends, so the only non-kin was therefore partner.

Of the three ways we categorized the students in our sample, civil status, sex and birth order, sex was the grouping that explained most of the variation with 78% percent of the tests significant. Birth order was second with 37% and civil status third with 25% of the tests showing significant differences.

Being single or in relationships of varying degrees of commitment should, following the logic of evolutionary psychology, activate differential sets of mental mechanisms leading to behaviors with predictable outcomes. Our results are suggestive of gift behavior following general evolutionary theories of inclusive fitness, courtship behavior and social alliance-dynamics. We saw that cohabiting students spent more on their partners than both married

students and students with partners; and married students spent least on and were not as reciprocal with their husbands/wives as the others. Gift giving with friends tended to recede with increased romantic commitment, with cohabiting students spending least on and having lower reciprocity with friends. Cohabiting students also spent least on their own family, seeming to channel their attention on their soon to be spouse. In short, gift giving to partner is stronger during situations of courtship, and it has a tendency to focus investment away from alliances and own kin, and this is what we would expect from evolutionary theory if gift behavior overlaps with courtship behavior and humans prioritize investment accordingly.

From our results, women displayed an overwhelmingly more active gift behavior than men. Only in 4 out of 29 significant tests were men more active than women, and all these showed men buying more expensive gifts. In general, women are more active in establishing and maintaining social alliances than men, while men are more preoccupied in establishing and maintaining social dominance. From our results it is suggestive that women use gifts as a part of this social networking. While using Christmas gifts as an instrument of social dominance might be a poor choice, men still seem to use gifts to impress more than women do (hence the fewer and more expensive gifts). More men than women procured all of their gifts by themselves making men more often the sole benefactor of a gift. Women reported enjoying making or buying gifts to a greater degree than men, and nearly three times as many women than men made at least one of the gifts they gave themselves. Self-made gifts can be more symbolic adding weight to women using gifts as icons of alliances rather than practical resource investments. If making gifts indicate more time spent on gift behavior, men can also be said to spend less time on it adding weight to their greater disinterest in gift giving.
The proposed theories underpinning this sexually differential behavior are central to the understanding of why women and men report such strikingly different investments and have such different gift behavior. Since reciprocity is central to gift giving (Geary, 1998, p.182), one would expect women to have had an EEA where acts of reciprocity of either practical or symbolic nature would be common stance; and more so than for men. Through marriage, women in most human hunter-gatherer cultures tend to shift residence to the birth group of their mate, while men tend to stay in their birth group (Geary, 1998). This represents a life-altering event for the woman; from being in a predominantly kin-based social setting to being in a non-kin one. A more active gift-giving behavior in women than men could be one of the evolutionary products of such events, since an increased propensity toward gift giving would stimulate beneficial reciprocal alliances with her non-kin social group (Geary, 1998). Gift giving with non-kin may also require higher levels of commitment than with kin (Essock-Vitale and McGuire, 1985; Hartup and Stevens, 1997; Trivers, 1971), thereby prompting a stronger selection pressure on women than men evolutionary differentiating their gift-giving behavior. Our findings that women gave about three times as many gifts alone to their partner's family as men, fits nicely with these theoretical observations.

Predictions 5, 6 and 7. Being the variable explaining the most of the variation in gift giving in our sample, sex differences fulfilled the expectations of all the three predictions. *Prediction 5*, that if a woman shifted social group after pair-bonding then a more active

gift-giving behavior than for men could have been selected for. We find strong indications for this in how much the woman invests alone in her partner's family compared with men. This ratio was almost 2.7, and when looking at how many more gifts women gave in total compared with men (women 13.3. men 8.1), even though they give significantly more, gives a ratio of "only" 1.6. *Prediction 6*, that women need support from own kin and friends during periods of pregnancy and breast-feeding. This is supported by the general finding that women *always* score higher than men in all tests of gift dynamics except that men give more expensive gifts. *Prediction 7,* that women need a larger support network than men because single female-female bonds are not adequate for the support needed by women. This prediction gains support from the large and significant difference between women and men in investing in their friends; women invest in more than twice as many friends. Although women give more gifts than men they are astonishingly laid-back when it comes to investing in male friends, in fact men invest significantly more in female friends than women invest in male friends (more than three times). Mysterud et al. (2006) has support for these three predictions and has found, like us, that women have many more gift-giving relations than men (our: women 13.3, men 8.1; their: women 13.6, men 8.4) and that they spend more money on gifts in total, but in contrast to us, they only found a significant difference between the sexes when they friends were included in the tests. When friends were removed the significant difference was also removed. We suspect that this is due to their smaller sample size.

When analyzing birth order, the differences between the groups were often very slight and the tests were mostly non-significant. The significant differences that were found, reported firstborns investing more than the others on almost all relations, middleborns focusing on friends and siblings, with lastborns having the laziest gift dynamic, but investing somewhat more on family than middleborns and though giving to fewer friends than the others, spending more per friend. Middleborns tended to have more siblings and therefore spent more on them. This consistently gave middleborns an increased level of investment in all our tests where siblings were involved, so we created a category of family members with siblings removed to test for middleborns general investment in other family members. The differences in significant results for middleborns between these two groups were striking: from having 6 positive significant results with siblings included to 0 positive significant results when they were removed. Clearly investing in siblings was the key factor for middleborns. Even though the differences were slight between the birth-order groups, when counting the incidences of maximum values a clear pattern emerged: firstborns were twice as active as middleborns and middleborns were almost twice as active as lastborns. The overall trends showed a very persistent image of a 4:2:1 relation in gift-giving dynamics between firstborns, middleborns and lastborns, respectively. Overall, our findings were expected from prevailing theories on family niches, sibling dynamics and personality psychology. Firstborns being more family oriented, conservative and dutiful, were expected to invest more in their family, and this was also found. Laterborns have been shown to be more rebellious, social and outgoing, especially middleborns, and we would therefore expect them to invest less in their families and more in their friends. Middleborns tend to be more flexible than lastborns and feel emotionally closer to their siblings. Our gift-behavior findings supported the personality reports: lastborns invested less in family and middleborns even less, but they tended to be more similar to firstborns when it came to

friends and they gave more to siblings. As noted in the birth order discussion, figures AF1 and AF2, and table AT9 and AT10 show these trends.

Prediction 8, that firstborns will invest more in their close relatives than laterborns, and *prediction 9,* that middleborns will invest less in their close relatives than lastborns and firstborns. These predictions have more or less been met with our data as discussed above. Mysterud et al. (2006) also found similar, and sometimes stronger, grounds for support of this prediction. They found that firstborns spent more on average per gift-giving relation, gave more to parents, brothers and grandparents than laterborns. They also measured frequency of encounters in a similar way that we did, showing firstborns having more contact with father than laterborns, but lastborns had more contact with mother than the others. Middleborns were shown to give more than the others to male friends (but not female friends); and finally, they preferred most often to let someone else buy or make at least one of their gifts for them. This can indicate that they are more disinterested than the others in family settings (when it is most likely that someone will procure a gift for you).

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Appendix

Table AT1. Students per faculty at the University of Oslo in 1999

Faculty	Number of registered students	Number of students available for sampling
Humanities	7,209	7,209
Social Sciences	6,011	6,011
Natural Sciences	5,505	5,505
Law*	4,754	-
Education	2,238	2,238
Medicine	2,134	2,134
Dentistry**	393	-
Theology**	348	-
Total	**28,592**	**23,097**

*Not intended to be included, but represented in survey. ** Not included and not represented.
Source: Database for Higher Education (DBH), http://dbh.nsd.uib.no/dbhvev/

Table AT2. Hand-out results

Type of result	Female	Male	Sum
Declined	41	62	103
Handed out	241	308	549
Returned valid	168	168	336
Returned invalid	2	2	4
Total returned	170	170	340
Returned blank	12		
Sum of students asked	**282**	**370**	**652**

Table AT3. Returns from males and females per field day

Day	Date	Females returned	Males returned
1	21.01.99	9	9
2	25.01.99	21	44
3	26.01.99	8	10
4	27.01.99	20	57
5	28.01.99	18	37
6	29.01.99	35	0
7	01.02.99	25	0
8	02.02.99	34	2
9	05.02.99	0*	11
Sum	**-**	**170**	**170**

*Females were specifically not asked on day 9 to balance male/female count ratio.

Table AT4. Returns from faculties per field day

Day	Date	Humanities	Natural Sciences	Social Sciences	Education	Medicine	Law	Sum
1	21.01.99	1	14	3				18
2	25.01.99	3	23	10	24		1	61
3	26.01.99		6		1	10		17
4	27.01.99	69	1	5			1	76
5	28.01.99	16	28	7			2	53
6	29.01.99	11	14	5			1	31
7	01.02.99	9	8	7			1	25
8	02.02.99	14	12	7	1		1	35
9	05.02.99	2	2	5	1		1	11
Total	**-**	**125**	**108**	**49**	**27**	**10**	**8**	**336***

*Sum with 9 added from answers that were blank/undecided on faculty affiliation.

Table AT5. Comparison table of the study by Mysterud et al. 2006 and this thesis

Variable	Mysterud et al.	This study
Sample size (n)	50	336
Female/male ratio	50%	50%
Mean age	26.0	22.9
Gift-giving relations (mean)	11.1	11.9 (8.1*)
Gift-receiving relations (mean)	10.7	8.8
Gifts given (mean)	14.4	13.0 (9.3*)
Gifts received (mean)	12.3	11.6
Average student's total spending (NOK)	1,501	1,689

*In parentheses: When gift giving is with the same categories of persons as gift receiving.

*Table AT6a. Significant results from analyses of birth-order effects on various gift-dynamic response-variables I**

Response variables	Predictor variables	Results	p-value	BO
Gift-giving relations with all relations	AGEGAP1	AL > L	p = 0.04	+M
Gift-giving relations with genetic family	LBO QBO	M > F M > F+L	p = 0,03 p < 0.01	+M
Gift-giving relations with friends	SEXPATTERN	FO > LS O > LS	p = 0.01 p = 0.02	-L +F
Gift-giving relations, women with female friends	FM-L	F+M > L	p = 0.05	-L
Gift-receiving relations with all relations	LBO	F > L M > L	p < 0.01	-L
Gift-receiving relations with genetic family	LBO QBO	F > L M > L M > F+L	p < 0.01 p = 0.03	-L +M
Gift-receiving relations with genetic family minus siblings	LBO	F > L F > M	p < 0.01	+F
Gift-receiving relations with half-near family	LBO	F > L F > M	p < 0.01	+F
Gift-receiving relations with friends	SEXPATTERN	FO > LS O > LS	p < 0.01 p = 0.01	+F -L
Gift-receiving relations, women with female friends	FM-L	F+M > L	p = 0.02	-L
Gifts given to all relations	AGEGAP1	AL > F AL > L	p < 0.01	+M
Gifts given to genetic family	AGEGAP1	AL > F AL > L	p < 0.01 p < 0.01	+M
Gifts given to genetic family minus siblings	AGEGAP2	O > M	p < 0.01	-M
Gifts given to siblings	LBO QBO	M > F M > L M > F+L	p < 0.01 p < 0.01	+M
Gifts given to half-near family	LBO	F > L F > M	P = 0.02	+F
Gifts received from all relations	LBO QBO	F > L M > L F+M > L	p < 0.01 p < 0.01	-L
Gifts received from genetic family minus siblings	LBO	F > L F > M	p < 0.01	+F
Gifts received from parents	F-L	F > L	p = 0.02	-F
Gifts received from siblings	LBO QBO	M > F M > L M > F+L	p < 0.01 p < 0.01	+M
Gifts received from half-near family	LBO	F > M F > L	p < 0.01	+F

Gifts received from friends	SEXPATTERN	O > LS FO > LS	p = 0.01 p < 0.01	-L
Gifts received from female friends by women	FM-L	FM > L	p = 0.02	-L

*Table AT6b. Significant results from analyses of birth-order effects on various gift-dynamic response-variables II**

Response variables	Predictor variables	Results	p-value	BO
Money spent per relation				
Money spent on mother	AGEGAP2	O > M	p < 0.01	-M
Money spent per grandparent	QBO	FL > M	p = 0.05	-M
Money spent per friend	QBO	M > FL	p = 0.05	+M
Money spent per gift				
Money spent per gift to friends	SEXPATTERN	LO > M LO > LS	p < 0.01 p < 0.01	+L
Money spent in total				
Money spent on grandparents	QBO	F+L > M	p = 0.05	-M
Money spent on sibling	LBO QBO	M > L M > F+L	p = 0.02 p < 0.01	+M
Money spent on friends	SEXPATTERN	O > LS FO > LS LO > LS	p = 0.04 p = 0,04 p < 0.01	-L
Value of gifts received				
Value of gifts received from genetic family	QBO	F+L > M	p =0.05	-M
Value of gifts received from half-near family	LBO QBO	F > M F > L F+L > M	p = 0.02 p = 0.03	+F -M

***Figure legend:** The predictor variable-column lists the different birth-order effects that were tested for, and the abbreviations are explained in the materials and methods section under 'categorization and coding of data'. The results describe one or several birth-order groupings that were significantly larger or smaller than others, for example O > M, means that only-children have some significantly larger value of a response variable than middleborns (the 'BO'-column depicts these significant groups with minus for significantly lower and plus for significantly higher, for example –M, and the groups are written as LBO (F, M or L)). The p-value-column shows the significant p-values for the specific tests.

Table AT7. Counts of significant results (p <= 0.05) for all birth-order tests

Birth order	Significant results with higher value	Significant results with lower value	Sum[1]
Firstborn	8	1	**9/81**
Middleborn	9	6	**15/81**
Lastborn	1	10	**11/81**

[1] Slash delineating the maximum *possible* significant results.

*Table AT8. Significant results (p <= 0.05) from specific categories of tests**

Test of relation	Firstborns		Middleborns		Lastborns		Sum
	Significant with higher value	Significant with lower value	Significant with higher value	Significant with lower value	Significant with higher value	Significant with lower value	
Genetic family		1	6	2		1	**10**
Family minus siblings	2			1			**3**
Half-near family	4			3			**7**
Friends	2		1		1	7	**11**
Sum	**8**	**1**	**7**	**6**	**1**	**8**	**31**

*Sometimes values are "doubled up", for example when lastborns get double count for friends and female friends in same cell.

Table AT9. Summaries of maximum values of every birth-order test regardless of significance of results

Summary of maximum	Firstborn	Middleborn	Lastborn	Test[1]
Gifts given and gift-giving relations	4	8	1	-
Gifts received and gift-receiving relations	4	8	1	-
Gifts given and gift-giving relations without siblings	4	3	1	-
Gifts received and gift-receiving relations without siblings	4	3	1	-
Money spent	25	4	8	$\chi^2 = 14.10$ $p < 0.01$
Value of gifts received	6	0	4	
All giving	29	12	9	$\chi^2 = 9.82$ $p < 0.01$
All receiving	10	8	5	
All	**39**	**20**	**14**	$\chi^2 = 10.05$ $p < 0.01$

[1] Results of Pearson Chi-square-test reported when conducted and if significant.

Table AT10. Categorized summaries of maximum values on every birth-order test regardless of significance of results

Summary of maximum per categories	Firstborn	Middleborn	Lastborn	Test[1]
Given to genetic family	4	4	0	-
Given to genetic family minus siblings	8	0	0	-
Given to half-near family	6	2	2	-
Given to friends	4	4	2	-
Sum	**22**	**10**	**4**	$\chi^2 = 10.23$ $p < 0.01$

[1] Results of Pearson Chi-square-test reported when conducted and if significant.

Table AT11. Definition of Sewall Wrights coefficient of relatedness (Wright 1922) and Hamilton's rule (Hamilton 1964)

Name	Unit/ Formula	Definition/examples
Coefficient of relatedness	r	0.5 = Parents, siblings, children 0.25 = Grandparents, uncles, aunts, nephews, nieces 0.125 = First cousins
Hamilton's rule	c < rb	An altruistic behavior towards an individual could evolve only if the benefits (b), multiplied by the coefficient of relatedness of the individual (r), outweigh the costs (c). The rule predicts animal to invest twice as much in an individual it shares half of it's genes with (r = 0.5) than one it shares a quarter (r = 0.25) with.

Figures depicting relative investment between linear birth-order groups (LBO)

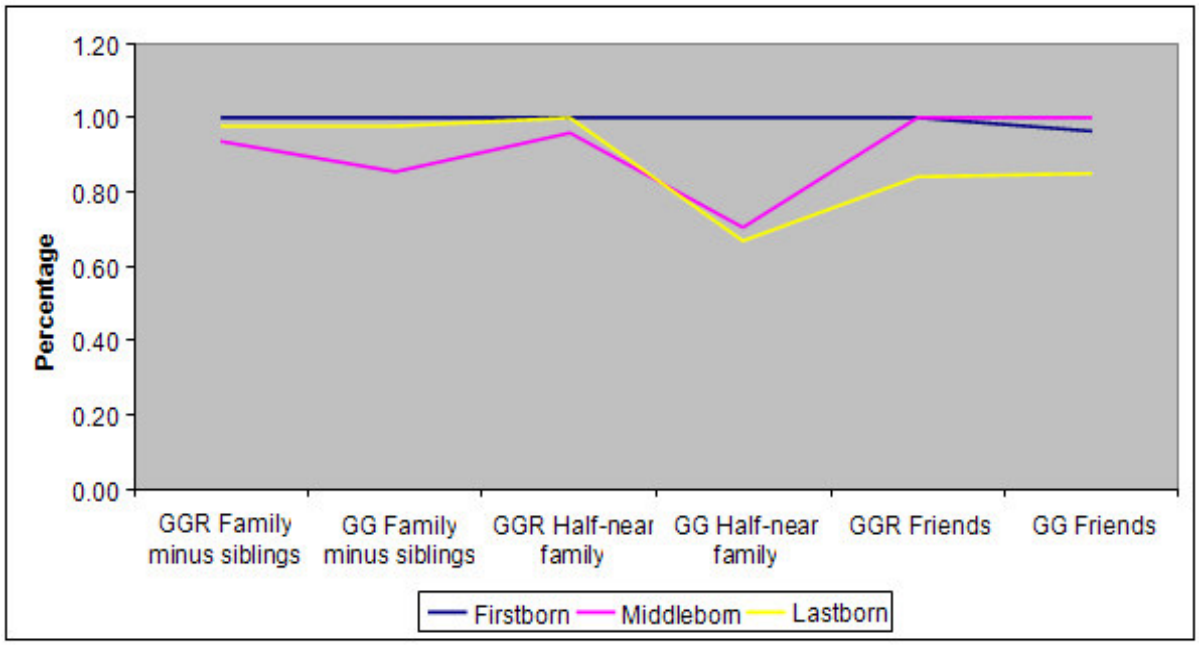

Figure AF1. Percentage comparison between firstborns, middleborns and lastborns on gift-giving relations (GGR) in gifts given (GG) to family minus siblings, half-near family and friends.

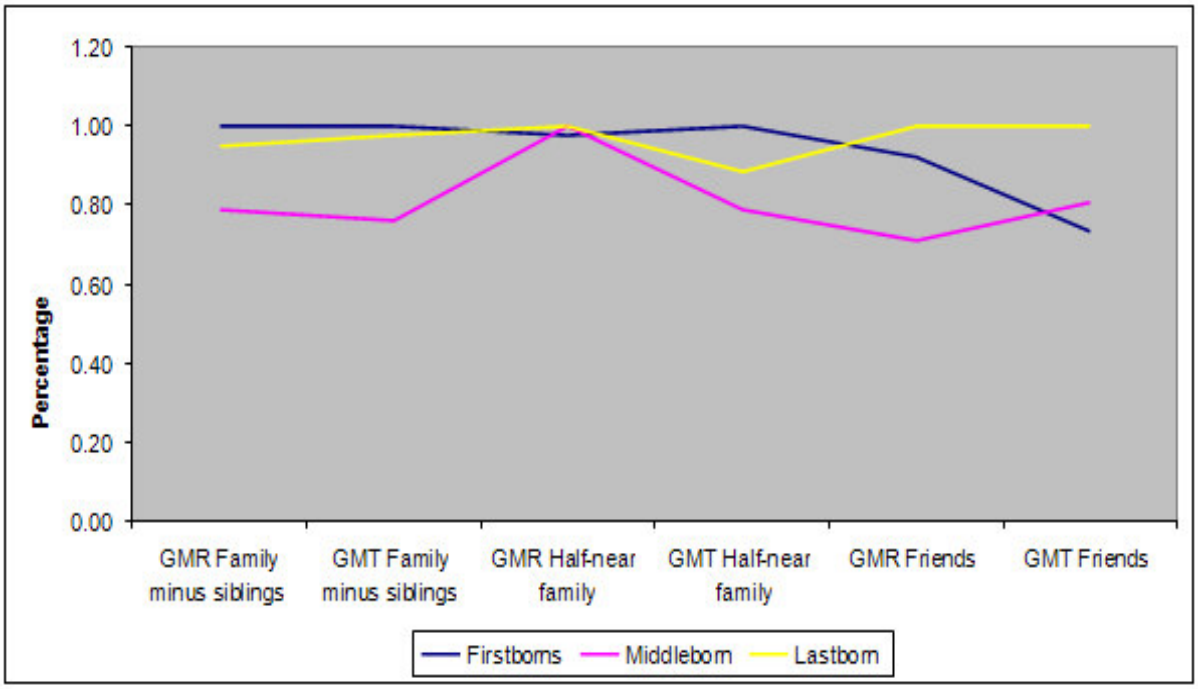

Figure AF2. Percentage comparison between firstborns, middleborns and lastborns in money spent per receiver (GMR) and money spent in total (GMT) on family minus siblings, half-near family and friends.

Figures depicting relative investment between age-gap birth-order groups (AGEGAP2)

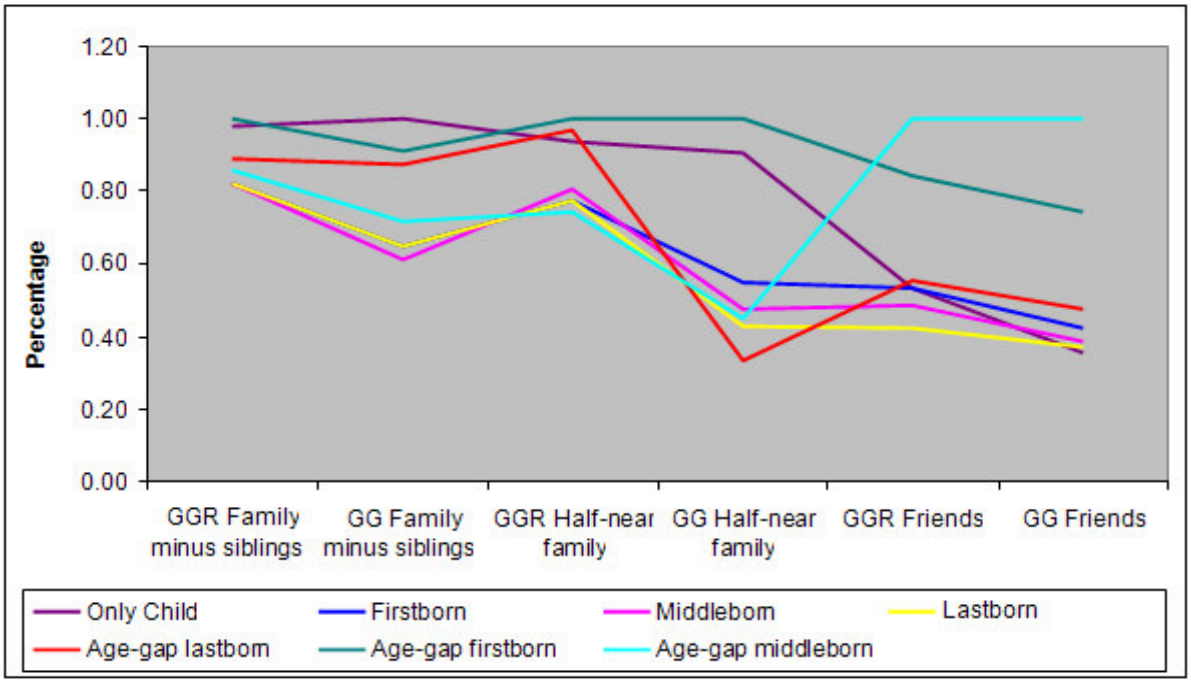

Figure AF3. Percentage comparison between only children (n = 22), age-gap firstborns (n = 14), firstborns (n = 124), age-gap middleborns (n = 6), middleborns (n = 54), lastborns (n = 90) and age-gap lastborns (n = 26) on gift-giving relations (GGR) with and gifts given (GG) to family minus siblings, half-near family and friends.

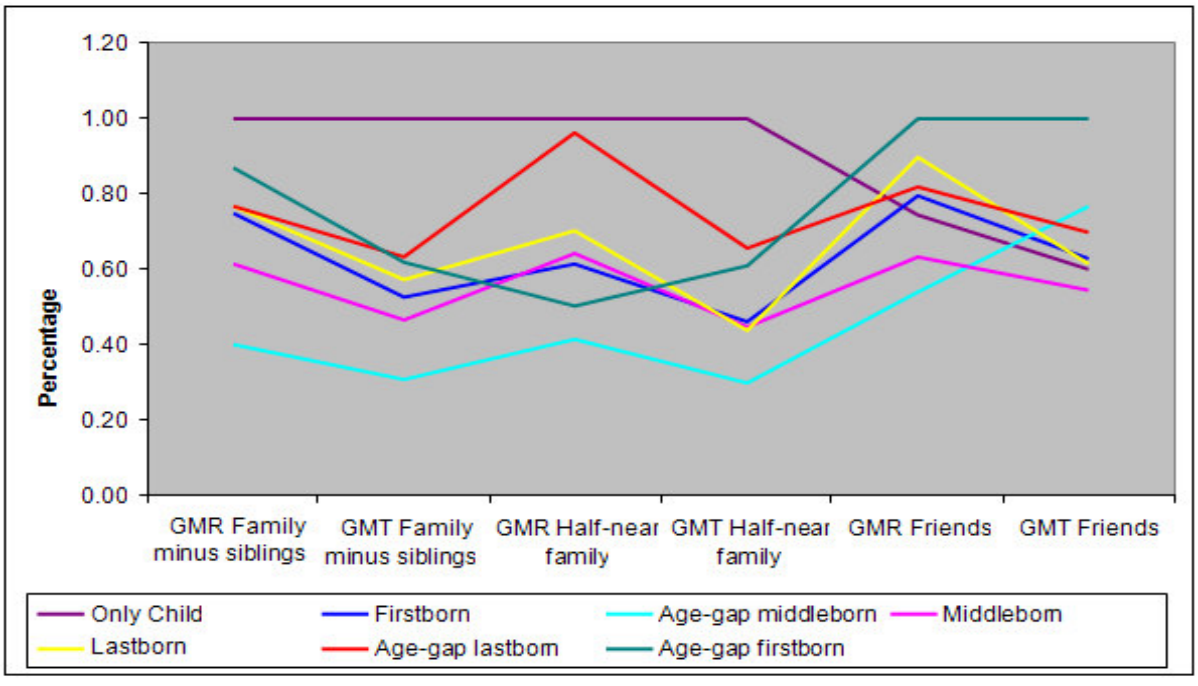

Figure AF4. Percentage comparison between only children (n = 22), age-gap firstborns (n = 14), firstborns (n = 124), age-gap middleborns (n = 6), middleborns (n = 54), lastborns (n = 90) and age-gap lastborns (n = 26) in money spent per receiver (GMR) and money spent in total (GMT) on family minus siblings, half-near family and friends.

Figures depicting relative investment between sex-pattern birth-order groups (SEXPATTERN)

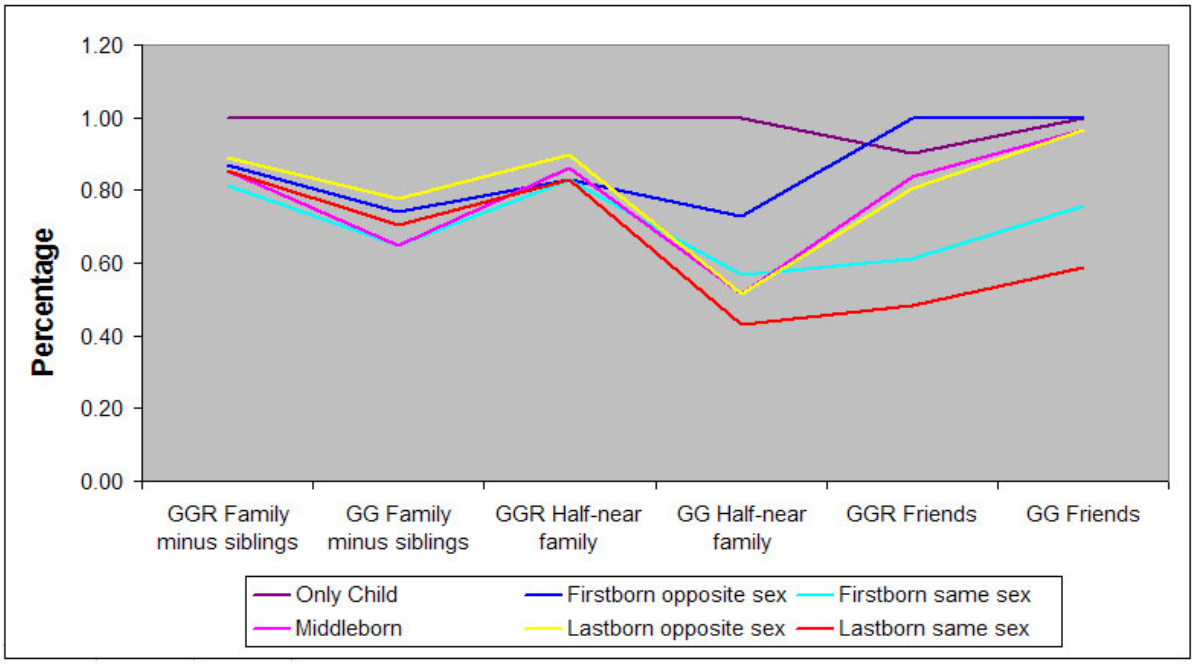

Figure AF5 Percentage comparison between only children (n = 39), firstborns with younger sibling of opposite sex (n = 54), firstborns with younger siblings of same sex (n = 70), middleborns (n = 57), lastborns with older siblings of opposite sex (n = 62) and lastborns with older siblings of same sex (n = 54) on gift-giving relations (GGR) with and gifts given (GG) to family minus siblings, half-near family and friends.

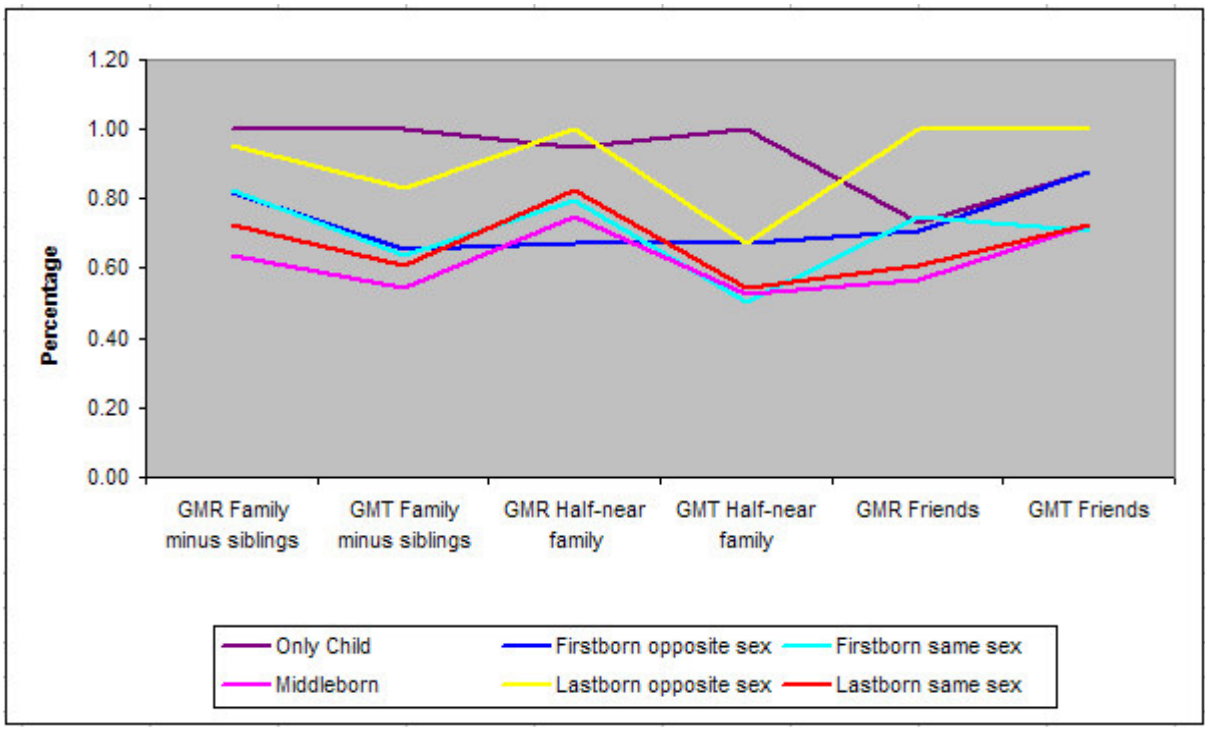

Figure AF6. Percentage comparison between only children (n = 39), firstborns with younger sibling of opposite sex (n = 54), firstborns with younger siblings of same sex (n = 70), middleborns (n = 57), lastborns with older siblings of opposite sex (n = 62) and lastborns with older siblings of same sex (n = 54) in money spent per receiver (GMR) and money spent in total (GMT) on family minus siblings, half-near family and friends.